Drexel University

Graduate Course Catalog
2015-2016

catalog.drexel.edu

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About Drexel University

Mission Statement

To serve our students and society through comprehensive integrated academic offerings enhanced by technology, co-operative education, and clinical practice in an urban setting, with global outreach embracing research, scholarly activities, and community initiatives.

Yesterday, Today, and Tomorrow

In 1891, near the end of a long and prosperous life, Philadelphia financier and philanthropist Anthony J. Drexel founded the Drexel Institute of Art, Science and Industry. As society's need for technically proficient leaders grew, so did Mr. Drexel's institution, first becoming the Drexel Institute of Technology in 1936, and then Drexel University in 1970. Drexel University is privately controlled, nonsectarian, and coeducational.

Today, nearly 16,000 undergraduate and over 9,000 graduate students attend Drexel's nine colleges and five schools:

- College of Arts and Sciences (http://drexel.edu/coas), which grants bachelor's, master's, and PhD degrees
- LeBow College of Business (http://www.lebow.drexel.edu), which grants bachelor's, master's, and PhD degrees
- Lebow College of Business: School of Economics (http://www.lebow.drexel.edu/faculty-and-research/disciplines/economics), which grants bachelors, master's and PhD degrees
- College of Computing & Informatics (http://www.cci.drexel.edu), which grants bachelor's, master's, and PhD degrees
- College of Engineering (http://www.drexel.edu/coe), which grants bachelor's, master's, and PhD degrees
- Pennoni Honors College (http://drexel.edu/catalog/school/pennoni.htm), which enriches the University experience for students from all majors with demonstrated academic achievement and broad intellectual interests
- Westphal College of Media Arts and Design (http://www.drexel.edu/westphal), which grants bachelor's and master's degrees
- Drexel College of Medicine (http://www.drexel.edu/med), which grants MD, master's and PhD degrees
- College of Medicine: School of Biomedical Science and Professional Studies (p. 54), which grants master's and PhD degrees
- College of Nursing and Health Professions (http://www.drexel.edu/cnhp), which grants bachelor's, master's, and PhD degrees
- Goodwin College of Professional Studies (http://drexel.edu/catalog/UG/goodwin), which grants interdisciplinary bachelor's and master's degrees, provides academic and professional support for all part-time undergraduate students, and offers continuing professional education courses
- School of Biomedical Engineering, Science, and Health Systems (http://www.biomed.drexel.edu), which grants bachelor's, master's, and PhD degrees
- School (http://drexel.edu/catalog/UG/goodwin) of Education (http://www.goodwin.drexel.edu/soe), which grants bachelor's, master's, EdD and PhD degrees, and recommends issuance of Pennsylvania instructional and teaching certificates
- Close School of Entrepreneurship (http://catalog.drexel.edu/undergraduate/schoolofentrepreneurship), providing curriculum and activities for students to learn and practice innovative behavior in alignment with all other colleges and schools at Drexel
- Center for Hospitality and Sport Management (p. 13), which grants bachelor's and master's degrees
- School of Public Health (http://www.publichealth.drexel.edu), which grants master's and doctorate degrees
- Thomas R. Kline School of Law (http://www.drexel.edu/law), which prepares students for the practice of law by offering a JD degree

Drexel Co-op

Drexel University has been a pioneer in cooperative education since 1919—operating one of the largest cooperative education programs in the nation. Undergraduates alternate on-campus study with full-time employment in fields related to their academic interests. More than 1,300 employer organizations in business, government, health care and education participate at locations in 30 states and 24 countries. The Steinbright Career Development Center (SCDC) is one of the most highly ranked co-op and career service organizations at any university in the country and works to ensure that students and alumni get the most from their experiential and career placement activities.

Technology

Technology is integrated into every aspect of the Drexel educational experience, marking the university as a leader in educational innovation.

Drexel made history in 1983 when it became the first university to mandate that all students must have personal access to a microcomputer. This tradition of leadership in integrating state-of-the-art technologies into a Drexel education continued when Drexel, in early 1998, inaugurated the first totally wireless library in the nation. In 2000, Drexel again made history by becoming the nation's first major university to offer completely wireless Internet access across the entire campus.

A pioneer in online learning, Drexel offers distance education programs leading to certificates and degrees in areas including engineering management, business administration, information systems and library and information science. Drexel University Online has over 7,500 unique students from all 50 states and more than 20 countries pursuing one of more than 130 graduate and undergraduate degree and certificate programs. Over all, there are more than 13,000 Drexel University students taking at least one course online.

Drexel is widely recognized for excellence in technology-based, experiential learning and is ranked among the best national doctoral universities by *U.S.News & World Report* in its "America's Best Colleges 2013." Drexel ranked third in the *US News* 2013 poll of America's "Up-and-Coming Schools."

Location

Drexel's 74-acre University City Main Campus is located in the vibrant University City district of Philadelphia, Pennsylvania. Drexel makes full use of its metropolitan setting by integrating Philadelphia and its resources into the classroom, co-op/internship experience, and student life, making it a model for other urban universities. The main campus is a 10-minute walk from Center City, the core of Philadelphia's commercial and business district.

Drexel teaches at six additional locations: the Center City Hahnemann Campus for the College of Nursing and Health Professions and the School of Public Health; the Queen Lane Medical Campus in East Falls for the College of Medicine; the Drexel at Delaware County Community

College campus in Media, Pennsylvania; the Drexel at Burlington County College campus in Mount Laurel, New Jersey; the Drexel at Montgomery County Community College campus in Blue Bell, Pennsylvania; and the Sacramento, California, Center for Graduate Studies.

Programs

Civic Engagement
Civic engagement, participation in the public life of the community, is important to the Drexel University's strategic plan. Civic engagement can take many forms, from volunteerism doing community service, to electoral participation and advocacy.

Drexel University offers a Certificate in Civic Engagement (http://catalog.drexel.edu/additionalacademicprograms/lindycenterforcivicengagement/civicengagementcert), designed for those whose commitment to civic engagement extends beyond the civic-engagement requirement of University 101, enables students of all majors to attach a recognized body of civic engagement work to their transcript. The program will also provide students with an intellectual core and an element of critical thinking for future civic engagement activities. The program is administered by the Lindy Center for Civic Engagement (http://www.drexel.edu/lindycenter).

Honors Program
The Pennoni College offers a number of academic options for its students. These opportunities are designed to be intensive, and are taught by faculty members who understand and accommodate Honors students' abilities and aspirations.

The Honors Program offers a number of academic options for its students. These opportunities are designed to be intensive, and are taught by faculty members who understand and accommodate Honors students' abilities and aspirations.
These options include:

- **Honors Colloquia**: These interdisciplinary courses introduce students to topics not typically covered elsewhere. These courses are small, discussion-based, seminar style classes. Past Honors Colloquia topics include: The Hidden God in Cinema; Theory of Special Relativity; The Graphic Novel; Torture and Terrorism, and many others.
- **Honors-Section Courses**: These courses fulfill traditional major requirements but offer Honors credit. While the subject remains the same, the classes are taught to smaller groups, consisting entirely of Honors students, and on an advanced level that encourages discussion and practical application. Honors-section courses include, among other subjects, physics, English, business, general psychology, chemistry, and biology.
- **Honors Options**: With permission from their instructors and approval from the Honors Program, Honors students may elect to enhance non-honors courses to yield honors credit. The student and faculty member conducting may agree on the specific terms before the course begins and jointly submit a proposal to the Honors Program.
- **Independent Study**: Honors students frequently come across topics in their general coursework that they would like to investigate in greater detail. To accommodate this, the Honors College encourages students to study and research a topic of their choosing with guidance from a faculty member.

The Great Works Symposium
The Great Works Symposium (http://www.drexel.edu/interdisciplinary-inquiry/great-works-symposium/overview) is a series of team-taught, interdisciplinary courses, each one focused upon a great human achievement or important global problem. Each course typically has at least three instructors, representing three different academic disciplines, and typically there is a series of about ten guest lecturers, recognized experts on the topic, also representing a wide variety of disciplines and points of view. Each course is broader in its content than what could be covered by any one academic discipline or any single textbook, but each has a concrete center of focus. Each topic is broad and important enough that it is relevant to the education of any student.

ROTC
The Army Reserve Officers' Training Corps (http://www.armyrotc.com/edu/drexel), established at Drexel in 1918, is an integral part of the University. Army ROTC courses are open to all students, and enrollment alone does not carry a military obligation. Students selected for the advanced course (normally pre-junior, junior, and senior years) will complete their academic and military studies concurrently, and upon graduation will be commissioned as lieutenants in the United States Army, Army Reserve, or Army National Guard. Participation in the advanced course may qualify participants to receive financial aid through a series of scholarships and cooperative education programs. For further information, contact the Professor of Military Science, Drexel University, The Armory, 33rd and Market Streets, Philadelphia, PA 19104.

Drexel students are eligible to participate in the Naval Reserve Officers' Training Corps (http://www.vpul.upenn.edu/nrotc) (NROTC) through a cross-enrollment agreement with the University of Pennsylvania. All naval science courses are held on Penn's campus. The NROTC program enables a college student to earn a commission in the Navy or the Marine Corps while concurrently satisfying requirements for his or her baccalaureate degree. Scholarship and nonscholarship programs are available.

Drexel students are eligible to participate in the Air Force Reserve Officers' Training Corps (http://www.sju.edu/afrotc) (AFROTC) through a cross-enrollment agreement with St. Joseph's University. All aerospace studies courses will be held on the St. Joseph's campus. The AFROTC program enables a college student to earn a commission as an Air Force officer while concurrently satisfying requirements for his or her baccalaureate degree.

Study Abroad
Drexel University's Study Abroad (http://drexel.edu/catalog/school/special/study-abroad.htm) programs are open to students in all disciplines who meet the qualifications of each individual program. Please see the study abroad website (http://www.drexel.edu/studyabroad) for eligibility requirements of each individual program and for the most up to date program offerings.

Certification of Proficiency in a Foreign Language
The University awards an advanced-level Certification of Proficiency in a foreign language in recognition of exceptional ability in oral and written communication in that language. Certification is listed on the official college transcript.

Examinations leading to proficiency certification include listening comprehension, reading comprehension, and written analysis, and the ETS Achievement Test, which is also the qualifying examination for proficiency testing. Certification also requires successful completion of an extensive oral interview, with at least a "2" rating on the FSI/ACTFL rating scale. Certification indicates proven ability to function effectively in professional and social situations in a country in which the target language is spoken.

Affirmative Action and Equal Opportunity

University Policy: Affirmative Action and Equal Opportunity
It is the policy of the University to provide a working and learning environment in which employees and students are able to realize their full potential as productive members of the University community. To this end, the University affirms its commitment to equal opportunity and nondiscrimination in employment and education for all qualified individuals regardless of race, religion, color, national origin, sex, age, sexual orientation, disability or applicable veteran status or any other characteristic protected by applicable federal or state law. Further, the University is committed to taking affirmative action to increase opportunities at all levels of employment and to increase opportunities for participation in programs and activities by all faculty, staff, and students.

Affirmative Action is directed toward racial and ethnic minorities, women, persons with disabilities, and Vietnam-era veterans. All member of the University community -- faculty, staff, and students – are expected to cooperate fully in meeting these goals.

It is the policy of the University that no qualified individual with a disability shall, on the basis of the disability, be excluded from participation in University programs and activities. Disability is defined as any physical or mental impairment that substantially limits one or more major life activities; or having a record of such impairment; or being regarded as having such impairment. A qualified individual with a disability means an individual as defined above, who is capable of performing the essential functions of a particular job or of participating in a particular course of study, with or without reasonable accommodations for his/her disability. Reasonable accommodations are determined on a case-by-case basis.

Accreditation

Drexel University's educational programs are accredited by MSCHE (Middle States Commission on Higher Education).

The Antoinette Westphal College of Media Arts and Design

- Architecture is one of the few part-time evening programs accredited by NAAB (National Architectural Accrediting Board).
- Design curricula are accredited by NASAD (National Association of Schools of Arts and Design).
- Media arts curricula, with the exception of the BS in Dramatic Writing, are accredited by NASAD (National Association of Schools of Arts and Design).
- The BS in Interior Design is accredited by CIDA (Council for Interior Design Accreditation).
- The MS in Interior Architecture and Design is accredited by CIDA (Council for Interior Design Accreditation).

The Bennett S. LeBow College of Business

- The Bennett S. LeBow College of Business is accredited by AACSB (Association to Advance Collegiate Schools of Business).

The College of Engineering

- The undergraduate programs for Architectural Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering Environmental Engineering, Materials Science and Engineering, and Mechanical Engineering are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.
- The Construction Management program is accredited by ACCE (American Council for Construction Education).
- The undergraduate Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The College of Arts and Sciences

- The Chemistry BS is certified by ACS (American Chemical Society).
- The Clinical Psychology PhD program is accredited by APA (American Psychological Association).
- The English Language Center is accredited by CEA (Commission on English Language Program Accreditation).

The College of Nursing and Health Professions

- Nursing programs are accredited by the CCNE (Commission on Collegiate Nursing Education), and the PA State Board of Nursing.
- The Couple and Family Therapy MFT degree and Post-Master's Certificates are accredited by COAMFTE (Commission on Accreditation of Marriage and Family Therapy Education).
- The Creative Arts in Therapy MA degrees in Dance/Movement Therapy, Music Therapy, and Art Therapy are approved by the ADTA (American Dance Therapy Association), the AMTA (American Music Therapy Association), and the AATA (American Art Therapy Association), respectively.
- The Didactic Program in Nutrition is accredited by ADA (American Dietetic Association).
- The Health Services Administration program is certified by AUPHA (Association of University Programs in Health Administration).

- The Nurse Anesthesia program is accredited by COA (Council on Accreditation of Nurse Anesthesia Educational Programs).
- The Nutrition and Foods BS is accredited by ADA (American Dietetic Association, Commission on Accreditation of Dietetic Education).
- The Professional Physical Therapy (DPT) program is accredited by CAPTE (Commission on Accreditation in Physical Therapy Education).
- The Physician Assistant program is accredited by ARC-PA (Accreditation Review Commission on Education for the Physician Assistant).
- The Radiologic Technology program is accredited by JRCERT (Joint Review Committee on Education in Radiologic Technology).

The College of Computing & Informatics

- The Computer Science BS and BA programs are accredited by the Computing Accreditation Commission (CAC) of ABET (http://catalog.drexel.edu/accreditation/%20http://www.abet.org).
- The Information Systems BS is accredited by the Computing Accreditation Commission (CAC) of ABET (http://catalog.drexel.edu/accreditation/%20http://www.abet.org). The College of Information Science and Technology was in the first group of schools to have their information systems programs be accredited by ABET (http://catalog.drexel.edu/accreditation/%20http://www.abet.org).
- The Library and Information Science MS degree is accredited by ALA (American Library Association).

The Drexel University College of Medicine

- The MD degree is accredited by LCME (Liaison Committee on Medical Education).
- The MS degree in Pathologists' Assistant program is accredited by NAACLS (National Accrediting Agency for Clinical Laboratory Sciences).

The Dornsife School of Public Health

- The Dornsife School of Public Health is accredited by CEPH (Council on Education for Public Health).

The School of Biomedical Engineering, Science and Health Systems

- The undergraduate biomedical engineering curriculum is accredited by the Engineering Accreditation Commission of ABET (http://catalog.drexel.edu/accreditation/%20http://www.abet.org).

The School of Education

- Teacher education programs leading to Pennsylvania State Teacher Certification for various K-12 specialties as well as Instructional Technology Specialist, School Principal, and School Superintendent certification programs are approved by the Pennsylvania Department of Education. Other state-approved programs include K-12 Library Science certification in collaboration with the College of Information Science and Technology and K-12 English as a Second Language Program Specialist in collaboration with the English Language Center.

The Thomas R. Kline School of Law

- The Thomas R. Kline School of Law is accredited by ABA (American Bar Association).

Any student or prospective student may request a copy of the documents describing the institution's accreditation. This information is available in

the Provost's Office and in the Financial Aid Office, both located in the Main Building.

Graduate Catalog

Center for Hospitality and Sport Management

Launched in 2013, the Center for Hospitality and Sport Management includes programs in hospitality management, culinary arts, food science and sport management. Through a focus on experiential learning and co-op opportunities, the center is positioned to fulfill distinct market needs. It provides experience in sport ticketing, restaurant management, arena management, food product development, recipe development, coaching, commercial kitchen design and layout, kitchen gardening and hotel front desk operations.

The Department of Culinary Arts and Food Science provides students with a well-rounded education within the realm of fine foods, service product development and quality assurance.

The Department of Hospitality and Tourism Management offers programs for students who are interested in the fast-paces fields of hospitality management, tourism, and gaming and casino operations. Due largely in part to Drexel's co-op program, graduates have a competitive advantage and invaluable training for successful career in the industry.

The Department of Sport Management produces students that embody leadership, management skills and professionalism, with a focus on sport business, media, marketing and law.

Majors

- Food Science (MS) (p. 13)
- Hospitality Management (MS) (p. 14)
- Sport Coaching Leadership (MS) (p. 15)
- Sport Management (MS) (p. 16)

Food Science

Major: Food Science
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 01.1001
Standard Occupational Classification (SOC) code: 19-1012

About the Program

The Master of Science (MS) in Food Science program at the Center for Hospitality and Sport Management provides students with the opportunity to comprehensively study theoretical and applied aspects of the science, technology, and engineering of foods. Food scientists learn to integrate and apply knowledge from the disciplines of chemistry, physics, engineering, microbiology, and nutrition in order to preserve, process, package, and distribute foods that are safe, nutritious, enjoyable, and affordable.

The program provides a science-based professional education that encompasses classroom theory, practical research, and application. Food science is concerned with foods, their ingredients, and their physicochemical and biochemical interactions at the molecular and cellular levels. Students in the food science program participate in the research enterprise by completing a research project or designing and

executing a thesis under faculty direction. Current research in food science includes:

- Thermal and non-thermal processing of foods and their impact on food quality
- Development of encapsulation systems for food ingredients
- Food product development
- Sensory analysis of foods

The program is designed for students who:

- are already working within the food industry and seeking professional advancement
- have an undergraduate degree in a general science-related area such as biology or chemistry, and would like to change fields or move into the more specialized field of food science

The MS in Food Science program offers students numerous opportunities for hands-on, real-world careers in applied science and technology. Potential employers include food product manufacturers, along with other companies providing services related to institutional feeding or supplying ingredients, processing equipment, and packaging materials. Technical and administrative positions are also available in various government agencies and with independent testing laboratories.
Food scientists are needed in the areas of:

- Food quality assessment and management
- Food processing and engineering
- Food product research and development
- Marketing and distribution
- Technical sales and support

Additional Information

Matthew Gray
Director, Marketing and Enrollment Management
215.895.6255
mattgray@drexel.edu

For additional information, view the Center for Hospitality and Sport Management's Master of Science in Food Science (http://drexel.edu/hsm/academics/Culinary-Arts-Food-Science/MS-in-Food-Science) web page.

Master of Science in Food Science

In addition to the program's admission requirements, students are expected to demonstrate competency in the coursework or its equivalent listed in the following table. The graduate committee evaluates each applicant's transcripts at the time of application. In some cases, courses listed as prerequisites may be taken as co-requisites during the first year of graduate study if deemed appropriate by the graduate admissions committee.

- General chemistry - One year to include organic chemistry
- Biochemistry - One or two quarters or semesters to include structures and basic metabolism
- Biological Science - Three courses to include general biology, genetics, and microbiology
- Mathematics - One year to include calculus
- Statistics - One course to include hypothesis testing, correlation, and regression

- Physics - Two terms or one year (non-calculus based) to include mechanics, optics, electricity, and magnetism

For information about admission requirements and to apply to the MS in Food Science, please visit the Office of Graduate Admissions (http://drexel.edu/grad/programs/hsm/food-science).

If you have any questions, or would like more information, please contact:

Matthew Gray
Director, Marketing and Enrollment Management
215.895.6255
mattgray@drexel.edu

Degree Requirements

Food Science Core Competency - Required

BIO 610	Biochemistry of Metabolism	3.0
or NFS 530	Macronutrient Metabolism	
or NFS 531	Micronutrient Metabolism	
FDSC 550	Food Microbiology	3.0
FDSC 551	Food Microbiology Laboratory	2.0
FDSC 556	Food Preservation Processes	3.0
FDSC 560	Food Chemistry	3.0
FDSC 662	Taste and Odor	3.0
FDSC 890	Seminar in Food Science	1.0
FDSC 480	Course FDSC 480 Not Found (Introduction to Food Engineering)	3.0
Food Science Electives		**12.0**

Select 12.0 credits from the following:

COOP 601	Advanced Co-op Guidance for Master's Degree Students	
FDSC 506	Food Composition & Behavior	
FDSC 554	Microbiology & Chemistry of Food Safety I	
FDSC 558	Nutritional Impact of Food Processing Methods	
FDSC 561	Food Analysis	
FDSC 568	Functional Foods	
FDSC 654	Microbiology & Chemistry of Food Safety II	
FDSC 669	Readings in Food Science	
Electives		**12.0**

Select 12.0 credits from the following:

BIO 610	Biochemistry of Metabolism	
BIO 660	Microbial Physiology	
CHEM 753	Chemical Instrumentation	
ENVS 636	Principles of Toxicology I	
ENVS 637	Principles of Toxicology II	
NFS 530	Macronutrient Metabolism	
NFS 531	Micronutrient Metabolism	
PSY 512	Cognitive Psychology	
Total Credits		**45.0**

Interdepartmental Faculty

Tali Gidalevitz, PhD *(University of Chicago).* Assistant Professor. Genetic and molecular pathways regulating protein folding homeostasis, and their role in protein conformation diseases, aging, and development.

Donna H. Mueller, PhD *(Temple University) Registered Dietitian, Nutrition and Foods.* Associate Professor. Clinical nutrition; pediatric nutrition; nutrition in pulmonary diseases, especially cystic fibrosis; nutrition in developmental delay; dental nutrition; dietetic education and professional development.

Jennifer Quinlan, PhD *(North Carolina State University).* Associate Professor. Food microbiology; microbiological quality and safety of produce, dairy and meat products in markets in high vs. low socioeconomics areas, Bacillus and Clostridium spores in food processing.

Vicki Schwartz, MS *(Drexel University) Nutrition and Foods.* Assistant Clinical Professor. Advanced nutrition, clinical nutrition, nutrition support.

Hospitality Management

Major: Hospitality Management
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.0904
Standard Occupational Classification (SOC) code: 11-9051; 11-9071; 11-9081

About the Program

This two-year online master's program provides a solid education in management, travel and tourism and allows students to choose concentrations in global tourism or gaming and casino management. Career paths include senior management of hotels and resorts, convention services, strategic development for online distribution of travel services, real-estate development projects and business ownership.

Both at the national and international level, travel and hospitality have become primary industries that require increasing numbers of professionals at all skill levels. Additional educational opportunities at the graduate level will be required to fill the needs of the tourism industry. Top professionals with an MS degree have excellent prospects at home and in the global marketplace.

Drexel University has a professional and technological emphasis as well as a track record of supporting the relationship between academics and industry. The degree in hospitality management is designed to prepare graduates to be key decision makers in the hospitality industry.

This two-year online master's degree will include courses such as program planning and creativity as well as specialized preparation in a concentration of either tourism or gaming and casino management.

For additional information, visit the Center for Hospitality & Sport Management's Master of Science in Hospitality Management (http://drexel.edu/hsm/academics/Hospitality-and-Tourism/MS-in-Hospitality-Management) page.

Admission Requirements

Classes start in the fall and spring terms. Applications are submitted throughout the year. Admission requirements include:

- a completed application form
- a Bachelor's degree from an accredited institution
- an undergraduate GPA of 3.0 or higher (graduate degree GPAs will be considered along with the undergraduate GPA)

- official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Applicants must supply transcripts regardless of the number of credits earned or the type of school attended. If an applicant does not list all post-secondary institutions on the application and these are listed on transcripts received from other institutions, processing of the application will be delayed until the remaining transcripts have been submitted.
- two letters of recommendation
- a personal essay
- a resume
- International students must submit a TOEFL score of 550 or higher. For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/isss/NewStudent.html) page.

Visit the Graduate Admissions (http://www.drexel.edu/grad/programs/hsm/hospitality-management) website for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

The Master of Science in Hospitality Management program requires completion of 45.0 credit hours (quarter) of study. The curriculum includes a core of 10 required courses (33.0 credits), including a research course where students consult with a faculty advisor to identify a suitable problem area in hospitality management and develop and carry out appropriate methodology to address the problem. Students also select one elective in consultation with their advisor. In addition, students take 12.0 credits in a concentration, either global tourism or gaming and casino management.

Core Courses		
CRTV 501	Foundations in Creativity	3.0
PROJ 501	Introduction to Project Management	3.0
PRST 503	Ethics for Professionals	3.0
PRST 504	Research Methods & Statistics	3.0
Hospitality Management Required Courses		
HRM 501	Foundations of the Hospitality Industry	3.0
HRM 505	Customer Service for Professionals	3.0
HRM 520	Hospitality Management Information Systems	3.0
HRM 555	Hospitality Human Resource Management	3.0
HRM 650	Strategic Management & Leadership in Hospitality	3.0
HRM 997	Research Project in Hospitality Management	3.0
Elective		
Students select one free elective in either the Hospitality Management department or outside the program in consultation with advisor.		3.0
Concentrations		12.0
Students select a concentration in either Global Tourism or Gaming and Casino Management		
Global Tourism		
Select four of the following:		
HRM 515	Destination and Resort Management	
HRM 595	Economics of Tourism	
HRM 610	The Global Tourism System	
HRM 612	Tourism and Sustainability	
HRM 614	Tourism Development	
HRM 616	Tourism Marketing and Branding	

Gaming and Casino Management		
Select four of the following:		
HRM 515	Destination and Resort Management	
HRM 572	Gaming Information Systems	
HRM 575	Current Issues in Gaming	
HRM 670	Casino Financial Analysis	
HRM 672	Security and Risk Management	
HRM 674	Tribal Gaming Management	
HRM 676	Casino Marketing	
Total Credits		**45.0**

Hospitality and Tourism Faculty

Robert Ambrose, MS *(Fairleigh Dickinson University)*. Instructor. Creative gaming floor applications, strategy development and implementation, executive decision making, the customer service experience within the casino/hospitality environment.

Linda Forristal, PhD *(Purdue University)*. Associate Teaching Professor. Destination management, marketing, branding, communications, cultural heritage tourism including foodways, indigenous tourism.

Donna Maguire, MPS *(Cornell University's School of Hotel Administration)*. Assistant Teaching Professor. Restaurant management, catering management, recipe and menu management, quality assurance, and food cost controls.

Michael Traud, JD *(Villanova University) Program Director, Hospitality and Tourism Management*. Assistant Clinical Professor. Implementation of Korean Cuisine in the United States; hospitality law; Italian cuisine.

Interdepartmental Faculty

Rosemary Trout, MS *(Drexel University) Interim Program Director, Culinary Arts and Food Science*. Instructor. Food labeling and regulations; food safety and sanitation in food service and food manufacturing; food processing; sensory evaluation.

Sport Coaching Leadership

Major: Sport Coaching Leadership
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13.1314
Standard Occupational Classification (SOC) code: 27-2022

About the Program

The MS in Sport Coaching Leadership program is an online master's program with a global component. The MS degree will prepare students in the areas of coaching theory, development of a coaching philosophy, understanding of the needs of athletes, recruitment, compliance, and program planning. The program will also expose students to comparative, global coaching models and allows for hands-on opportunities in the form of three practicums. The goal of the program is to prepare students for professional coaching careers in scholastic, collegiate, or competitive developmental leagues.

Admission Requirements

The MS in Sport Coaching Leadership requires a bachelor's degree from an accredited university. Candidates should have an undergraduate GPA of 3.00 or higher and some experience in the coaching, teaching, or sport management fields.

Degree Requirements

SCL 501	Coaching Theory and Principles	3.0
PHIL 502	Ethics in Coaching	3.0
SMT 602	Sport Law & Risk Management	3.0
SCL 614	Sport Performance & Energy Systems	3.0
SCL 615	Athletic Recruiting	3.0
SCL 616	Sport Conditioning	3.0
SCL 618	NCAA Compliance	6.0
SCL 617	Prevention & Care of Athletic Injuries	3.0
SCL 619	Global Coaching Seminar	0.5
SCL 695	Coaching Practicum I	0.5
SCL 696	Coaching Practicum II	2.0
SCL 697	Coaching Practicum III	3.0
SMT 607	Sport Budgets & Fiscal Practices	3.0
SMT 612	Development & Fundraising Strategies in Sport	3.0
SMT 628	Coaching and Management	3.0
SMT 629	Managing Coaches & Teams	3.0
Total Credits		**45.0**

Sample Plan of Study

Term 1		Credits
SMT 602	Sport Law Risk Management	3.0
SCL 501	Coaching Theory and Principles	3.0
SCL 695	Coaching Practicum I	0.5
	Term Credits	**6.5**
Term 2		
SCL 614	Sport Performance Energy Systems	3.0
PHIL 502	Ethics in Coaching	3.0
	Term Credits	**6.0**
Term 3		
SMT 607	Sport Budgets Fiscal Practices	3.0
SCL 615	Athletic Recruiting	3.0
SCL 696	Coaching Practicum II	0.5
	Term Credits	**6.5**
Term 4		
SCL 619	Global Coaching Seminar	6.0
	Term Credits	**6.0**
Term 5		
SMT 612	Development Fundraising Strategies in Sport	3.0
	Term Credits	**3.0**
Term 6		
SCL 616	Sport Conditioning	3.0
SCL 618	NCAA Compliance	3.0
	Term Credits	**6.0**

Term 7		
SCL 617	Prevention Care of Athletic Injuries	3.0
SCL 697	Coaching Practicum III	2.0
	Term Credits	**5.0**
Term 8		
SMT 628	Coaching and Management	3.0
SMT 629	Managing Coaches Teams	3.0
	Term Credits	**6.0**

Total Credit: 45.0

Sport Management Faculty

Lawrence Cohen, JD *(Temple University).* Assistant Teaching Professor. Sports and antitrust law; tickets sales data analytics; sport sponsorship trends.

Amy Giddings, PhD *(Temple University) Director, Sport Coaching Leadership.* Associate Teaching Professor. International aspects of sport and culture, principles of coaching, teambuilding, group dynamics, minority issues in sport including availability and accessibility concerns, character development.

Joel Maxcy, PhD *(Washington State University) Interim Program Director, Sport Management.* Associate Professor. Economics of sport; labor economics & policy; economics of antitrust & regulation;sports analytics.

Jim Reese, EdD *(University of Northern Colorado).* Associate Professor. Sport ticket sales, strategies, and operations; quantitative analysis and statistics for sport; economic aspects of sport management.

Ellen Staurowsky, EdD *(Temple University).* Professor. Social justice issues in sport; gender equity in sport; Title IX pay equity and equal employment opportunity; athlete exploitation; college sport reform; and misappropriation of American Indian imagery in sport.

Karen Weaver, EdD *(University of Pennsylvania).* Associate Clinical Professor. Sport marketing, promotions, public relations, media, and leadership in sport.

Sport Management

Major: Sport Management
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 31.0504
Standard Occupational Classification (SOC) code: 11-1021

About the Program

This program is designed both for individuals already working in the sport management industry as well as for individuals who are new to the industry and looking to make a career change from a "mainstream industry" (such as marketing or finance) into the more specialized field of sport management. Graduates of the MS program in Sport Management will be uniquely qualified in leadership and management in a wide spectrum of organizations within the sport industry including professional sport, collegiate athletics, recreation and leisure sport venues, sport agency, and corporate sport enterprises as well as a range of health and fitness facilities.

The Master of Science in Sport Management program prepares its graduates for positions in sport management at all levels (recreational, youth, inter-scholastic, amateur, collegiate, professional) and within several organizational settings (public, private, non-profit, corporations).

The program content provides an integrated educational experience directed toward developing the ability to apply knowledge and skills to the planning, design, implementation, and evaluation of sport programs and offer solutions to practical problems in the sport management field. Graduates are expected to be leaders in their chosen area of interest by incorporating the various perspectives from the multidisciplinary training and applying them to current issues in sport and society.

Program Goals

Graduates of the Master of Science in Sport Management will be able to:

- Apply the fundamentals of business to sport management.
- Integrate the principles of management; organizing people and resources to get results in the field of sport.
- Apply the area of law and labor relations to the sports industry and agency.
- Use existing technologies and be prepared for emerging technologies in the sport management field.
- Forecast new developments and adapt to the rapidly changing sports environment.
- Creatively direct the economic contributions that sports and recreation offer to people, organizations, and the community.
- Effectively organize, evaluate and improve and use new information in sports.
- Utilize the knowledge and skills learned to produce an in-depth research project or thesis, which will serve to advance the study of sport management.

For additional information, view the Center for Hospitality and Sport Management's Sport Management program (http://drexel.edu/hsm/academics/Sport-Management) web page.

Degree Requirements

Core Foundation Courses

SMT 601	Sports Industry Management	3.0
SMT 602	Sport Law & Risk Management	3.0
SMT 604	Sport Media & Technology	3.0
SMT 607	Sport Budgets & Fiscal Practices	3.0
SMT 608	Sport Information & Public Relations	3.0
SMT 609	Sports Ticket Sales & Strategies	3.0
SMT 611	Corporate Sponsorship Sales & Strategies in Sport	3.0
SMT 612	Development & Fundraising Strategies in Sport	3.0
SMT 621	Leadership in Sport Management	3.0
SMT 626	Globalization of Sport	3.0
SMT 635	Sport Facilities & Event Management	3.0

Sport Management Elective Courses [*]		6.0
Select two of the following:		
SMT 606	Contemporary Issues in Sport	
SMT 622	Labor Relations & Collective Bargaining in Sport	
SMT 629	Managing Coaches & Teams	
SMT 630	Sports Industry Practicum	
SMT 633	Sport Tourism Strategies	
SMT 640	Consumer Behavior in Sport	
SMT 680	Course SMT 680 Not Found	
SMT 690	Course SMT 690 Not Found	
Project/ Research Thesis		
SMT 698	Research Design & Techniques in Sport	3.0
SMT 699	Project/Research Thesis	3.0
Total Credits		**45.0**

[*] Additional options for electives outside the Department may be approved by the advisor.

Sample Plan of Study

First Year		
Fall		**Credits**
SMT 601	Sports Industry Management	3.0
SMT 602	Sport Law Risk Management	3.0
	Term Credits	**6.0**
Winter		
SMT 604	Sport Media Technology	3.0
SMT 626	Globalization of Sport	3.0
	Term Credits	**6.0**
Spring		
SMT 607	Sport Budgets Fiscal Practices	3.0
SMT 608	Sport Information Public Relations	3.0
	Term Credits	**6.0**
Summer		
SMT 621	Leadership in Sport Management	3.0
SMT 635	Sport Facilities Event Management	3.0
	Term Credits	**6.0**
Second Year		
Fall		
SMT 609	Sports Ticket Sales Strategies	3.0
SMT 611	Corporate Sponsorship Sales Strategies in Sport	3.0
	Term Credits	**6.0**
Winter		
SMT 612	Development Fundraising Strategies in Sport	3.0
Elective [*]		3.0
	Term Credits	**6.0**
Spring		
SMT 698	Research Design Techniques in Sport	3.0
Elective [*]		3.0
	Term Credits	**6.0**
Summer		
SMT 699	Project/Research Thesis	3.0
	Term Credits	**3.0**

Total Credit: 45.0

[*] One (1) Sport Management elective (http://www.drexel.edu/catalog/masters/sport.htm)

Sport Management Faculty

Lawrence Cohen, JD *(Temple University)*. Assistant Teaching Professor. Sports and antitrust law; tickets sales data analytics; sport sponsorship trends.

Amy Giddings, PhD *(Temple University) Director, Sport Coaching Leadership*. Associate Teaching Professor. International aspects of sport and culture, principles of coaching, teambuilding, group dynamics, minority issues in sport including availability and accessibility concerns, character development.

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Ellen Staurowsky, EdD *(Temple University)*. Professor. Social justice issues in sport; gender equity in sport; Title IX pay equity and equal employment opportunity; athlete exploitation; college sport reform; and misappropriation of American Indian imagery in sport.

Karen Weaver, EdD *(University of Pennsylvania)*. Associate Clinical Professor. Sport marketing, promotions, public relations, media, and leadership in sport.

Close School of Entrepreneurship

Entrepreneurship is a central theme of the Drexel University Strategic Plan 2012-2017: Transforming the Modern University. The cultivation of entrepreneurship and innovation is the key to success in today's world. Drexel's strong entrepreneurial and innovative culture extends across academic programs through curricular and experiential activities, faculty and student research, and various partnerships with business, non-profits, and government.

The Charles D. Close School of Entrepreneurship is the hub of such activities, working in alignment with all colleges and schools at Drexel. As a freestanding academic school it provides curricula and activities for students to learn and practice innovative behavior.

The Close School defines entrepreneurship as more than starting a company or sparking innovation with established companies. For the Close School, entrepreneurship consists of three dimensions:

- A habit of mind and an attitude; a skill set applicable to pursuing innovation in business, personal, and career contexts.
- An approach to life built around innovative thinking, calculated daring, and proactive behavior.
- The process through which an individual or team creates or recognizes opportunities to pursue something of value, regardless of the resources available.

Majors

- Entrepreneurship and Innovation (MS) (p. 19)

Entrepreneurship and Innovation

Major: Entrepreneurship and Innovation
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.0701
Standard Occupational Classification (SOC) code: 11-1011; 11-1021; 11-9199

About the Program

The Charles D. Close School of Entrepreneurship is founded on the principle that entrepreneurship encompasses more than starting a new venture. Entrepreneurship is a habit of mind and an attitude; a skill set applicable to pursuing innovation in business, personal, and career contexts; and an approach to life built around innovative thinking, calculated daring, and proactive behavior.

The MS in Entrepreneurship and Innovation is designed for recent graduates or working professionals who wish to increase their knowledge and experiences in innovation and entrepreneurship. The MS focuses on developing the "individual as entrepreneur" as well as an understanding of the "process of entrepreneurship."

The MS in Entrepreneurship and Innovation is preparing to enroll students beginning in the Fall of 2017.

For additional information about the MS in Entrepreneurship and Innovation, please contact Ian Sladen at is27@drexel.edu.

Degree Requirements

Required Courses

ENTP 501	Entrepreneurship Essentials	3.0
BUSN 501	Measuring and Maximizing Financial Performance	3.0
CRTV 503	Creativity in the Workplace	3.0
PLCY 509	Sustainability & Public Policy	3.0
ENTP 610	Leading New Ventures	3.0
ENTP 620	Learning from Failure	3.0
ENTP 640	Methods of Entrepreneurship	3.0
ENTP 650	Innovation & Ideation	3.0
ENTP 660	Early Stage Venture Funding	3.0
ENTP 690	The Lean Launch	3.0
Required Sequence		
ENTP 647	Personal Dynamics: Starting a New Venture	3.0
ENTP 667	Building Internal & External Relationships	3.0
ENTP 697	Defining Entrepreneurial Success	3.0
Electives		6.0

Choose two of the following graduate electives, OR two from other units (upon advisor approval):

ENTP 535	Social Entrepreneurship	
ENTP 545	Entrepreneurship in Emerging Markets	
ENTP 565	Franchising	
ENTP 585	Innovation in Established Companies	
ENTP 670	Clean Venture Lab	
BLAW 646	Legal Issues in New Ventures	
MGMT 620	Technology Commercialization	

| **Total Credits** | | **45.0** |

Sample Plan of Study

Term 1		Credits
ENTP 501	Entrepreneurship Essentials	3.0
ENTP 610	Leading New Ventures	3.0
	Term Credits	**6.0**
Term 2		
BUSN 501	Measuring and Maximizing Financial Performance	3.0
ENTP 620	Learning from Failure	3.0
	Term Credits	**6.0**
Term 3		
CRTV 503	Creativity in the Workplace	3.0
ENTP 640	Methods of Entrepreneurship	3.0
	Term Credits	**6.0**
Term 4		
ENTP 650	Innovation Ideation	3.0
ENTP 660	Early Stage Venture Funding	3.0
	Term Credits	**6.0**
Term 5		
ENTP 647	Personal Dynamics: Starting a New Venture	3.0

Entrepreneurship Elective		3.0
	Term Credits	**6.0**
Term 6		
ENTP 690	The Lean Launch	3.0
ENTP 667	Building Internal External Relationships	3.0
	Term Credits	**6.0**
Term 7		
PLCY 509	Sustainability Public Policy	3.0
ENTP 697	Defining Entrepreneurial Success	3.0
Entrepreneurship Elective		3.0
	Term Credits	**9.0**

Total Credit: 45.0

College of Computing and Informatics

The College of Computing & Informatics provides a focal point for the broad range of inquiry related to computation and information. The College addresses both theory and practice along dimensions that include technical, human, organizational, policy, and societal considerations. This broad expertise positions the College's educational and research programs to address the complex, multi-disciplinary problems that are increasingly common as society becomes ever more dependent on information technology.

Founded in fall 2013, the College unites the faculty, staff, and students from the former College of Information Science and Technology (the iSchool), the Department of Computer Science from the College of Engineering and the Department of Computing and Security Technology from Goodwin College of Professional Studies. For more information, please visit the College's website (http://www.drexel.edu/cci).

Majors

- Computer Science (MSCS, PhD) (p. 24)
- Health Informatics (MSHI) (p. 32)
- Information Studies (PhD) (p. 30)
- Information Systems (MSIS) (p. 36)
- Library and Information Science (MSLIS) (p. 40)
- National Security Management (MSNSM) (p. 47)
- Software Engineering (MSSE) (p. 49)

Certificates

- Archives Specialist (p. 21)
- Competitive Intelligence/Knowledge Management Specialist (p. 23)
- Continuity Management (p. 22)
- Cybersecurity, Law and Policy (p. 22)
- Digital Curation Specialist (p. 29)
- Digital Libraries Specialist (p. 30)
- Healthcare Informatics (p. 33)
- Homeland Security (p. 22)
- Information Studies and Technology (Advanced Certificate) (p. 21)
- Intelligence (p. 23)
- Youth Services Specialist (p. 53)

Advanced Certificate in Information Studies and Technology

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 24.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 11.0401

Standard Occupational Classification (SOC) Code: 15-1199

This non-degree program provides specialized training beyond the master's degree so that practitioners can update and extend their skills and knowledge by adding position-relevant coursework in order to meet their current employment requirements. It is not intended to provide coursework that can be applied to the College of Computing & Informatics' master's or doctoral degrees. The program leads to an Advanced Certificate in Information Studies and Technology awarded through the College of Computing & Informatics.

Admission Requirements

Applicants must have completed a master's degree in areas such as library science, computer or information science, information systems, instructional technology, software engineering, or other appropriate degrees from a suitable accredited program that has prepared them for advanced study in the area chosen for specialization. Applicants must meet all the general requirements for admission to graduate studies and the College of Computing & Informatics. Admissions requirements include: completed graduate application form, photocopies of transcripts from all colleges and/or universities attended, essay, resume and Graduate Record Examination (or equivalent), if required.

Requirements

The Advanced Certificate in Information Studies and Technology consists of a minimum of eight courses that must be completed within three calendar years. Students must take four INFO courses as well as complete the final independent study within the College. The three remaining courses may be taken from offerings within the College or from other programs in the University, based on consultation with the student's advisor and agreement of the faculty mentor.

More courses, including a practicum in place of the independent study, may be required for students holding a master's in library science who are seeking certification as School Library/Media specialists in Pennsylvania.

Additional Information

For additional information, view the College of Computing & Informatics Advanced Certificate in Information Studies and Technology (http://drexel.edu/cci/programs/professional-development-programs/advanced-certificate-in-information-studies-and-technology) web page.

Archives Specialist Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not eligible
Classification of Instructional Program (CIP) Code: 25.0103
Standard Occupational Classification (SOC) Code: 25-4011

This certificate is designed for professionals already holding a master's degree from an ALA-accredited program or a graduate degree closely related to this specialization.

The specialization in archival studies focuses on the practice and theory of managing collections of records and papers in a variety of archival settings, including governmental agencies, libraries, historical societies,

corporations, not-for-profit organizations, museums, and religious institutions.

The course content within this specialization provides the educational component required for post-graduate certification by the Academy of Certified Archivists. This certification may also be of interest to students planning careers in academic and special libraries.

The program must be completed within five years.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/post-masters-specialist-program).

Required Courses

INFO 560	Introduction to Archives I	3.0
INFO 561	Introduction to Archives II	3.0
INFO 750	Archival Access Systems	3.0
Students select two of the following courses:		6.0
INFO 751	Archival Appraisal	
INFO 755	Electronic Records Management	
INFO 756	Digital Preservation	
Total Credits		**15.0**

Certificate in Continuity Management

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 43.0302
Standard Occupational Classification (SOC) Code: 11-9161; 11-9199

Continuity Management is the discipline of dealing with and avoiding risks. A vital component of a business continuity/emergency management program is to prepare entities for possible disruption of operations with plans that resume affected business services as quickly as possible.

The Certificate in Continuity Management equips students, both tactically and strategically, to understand and respond to the four domains of continuity/emergency management: mitigation/prevention, preparedness, response, and recovery.

Credits earned in the Certificate in Continuity Management program may not be transferred to the MS in National Security Management.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/graduate-certificate-continuity-management).

HSM 644	Public Management in Crisis	3.0
HSM 645	Emergency Incident Risk Management	3.0
HSM 646	Infrastructure Disaster Recovery	3.0
Total Credits		**9.0**

Certificate in Cybersecurity, Law and Policy

Certificate Level: Graduate
Admission Requirements: Bachelor's Degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 11.1003
Standard Occupational Classification (SOC) Code: 15-1122

The certificate explores the vulnerabilities that arise from the use of cyberspace. The certificate coursework explores how the United States and the many other nations are responding to those vulnerabilities and how to analyze the policy and legal frameworks that are developing.

Students will examine issues relating to the organization of the Internet and cyberspace to understand how both governmental entities, and private parties, may – and do – respond to cyber threats under the current legal and policy frameworks. Students will be introduced to policy and legal concepts relating to the private sector and civilian government engagement in cyberspace. The program will also include an examination of the application of traditional laws of armed conflict to the new cyber domain.

Credits earned in the Certificate in Cybersecurity, Law & Policy program may not be transferred to the MS in National Security Management.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/certificate-in-cybersecurity-law-and-policy).

Required Courses

INFO 517 (p. 22)	Princ of Cybersec	3.0
INFO 717 (p. 22)	Cyber Crime Law	3.0
INFO 718 (p. 22)	Cybersec Policy	3.0
Total Credits		**9.0**

Certificate in Homeland Security

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter

Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 43.0301
Standard Occupational Classification (SOC) Code: 33-9099

The Homeland Security Certificate will introduce students to the various aspects of Homeland Security. It will examine the evolution of Homeland Security as a concept, a legal framework and the redirection of national policies to align with various threats. By completing the certificate, students will understand the complexities of today's security environment and be prepared to use that knowledge in a variety of security related fields.

Credits earned in the Certificate in Homeland Security program may not be transferred to the MS in National Security Management.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/graduate-certificate-homeland-security).

HSM 544	Introduction to Homeland Security	3.0
CST 604	Technology for Homeland Security	3.0
HSM 549	Terrorism and Homeland Security	3.0
Total Credits		**9.0**

Certificate in Intelligence

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 29.0202
Standard Occupational Classification (SOC) Code: 15-1122

Intelligence is produced from information which is gathered to enhance the security of the state. It divides into two kinds of materials and activities: foreign intelligence, designed to enable the state to conduct effective diplomatic, military and economic activities in the international arena; and domestic intelligence, utilized by the state to monitor perceived threats within its territory.

The Certificate in Intelligence program will introduce students to advanced theoretical and practical frameworks for the study of intelligence and its application in a wide variety of contexts, both foreign and domestic. Students will develop skills in each stage of the intelligence cycle: requirements, collection, analysis, and dissemination.

Credits earned in the Certificate in Intelligence program may not be transferred to the MS in National Security Management.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/graduate-certificate-intelligence).

CST 609	National Security Intelligence	3.0
INFO 719	Introduction to National Security Enterprise	3.0
CST 614	Counterintelligence	3.0
Total Credits		**9.0**

Competitive Intelligence and Knowledge Management Specialist Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not eligible
Classification of Instructional Program (CIP) Code: 25.9999
Standard Occupational Classification (SOC) Code: 15-1111

The Competitive Intelligence/Knowledge Management Specialist certificate program is designed for professionals already holding a master's degree from an ALA-accredited program or a graduate degree closely related to this specialization.

This specialization focuses on information needs and knowledge management in special library, corporate, and other organizational settings.

The program must be completed within five years.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/post-masters-specialist-program).

Required Courses

INFO 643	Information Services In Organizations	3.0
INFO 644	Knowledge Assets Management in Organizations	3.0
INFO 678	Competitive Intelligence	3.0
Select one of the following:		3.0
INFO 624	Information Retrieval Systems	
INFO 674	Digital Scholarship in Science & Technology	
INFO 675	Resources in the Health Sciences	
INFO 677	Resources in Business	
INFO 680	US Government Information	
INFO 681	Legal Research	
Select one of the following:		3.0
INFO 612	Knowledge Base Systems	
INFO 622	Content Representation	
INFO 650	Public Library Service	
INFO 651	Academic Library Service	
INFO 653	Digital Libraries	
INFO 658	Information Architecture	
INFO 662	Metadata and Resource Description	

INFO 679	Information Ethics
Total Credits	**15.0**

Computer Science

Major: Computer Science
Degree Awarded: Master of Science in Computer Science (MSCS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MSCS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 11.0701
Standard Occupational Classification (SOC) code: 11-3021; 15-1111; 15-1131; 15-1132; 15-1199

About the Program

The Department of Computing in the College of Computing & Informatics (http://www.drexel.edu/cci) houses research groups actively conducting research on a wide range of topics in Computer Science including artificial intelligence, algorithms, computer vision and graphics, programming languages, networks, privacy and security, high-performance computing, software engineering, computer algebra, and algorithms. The department emphasizes both interdisciplinary and applied research and is supported by major federal research grants from the National Science Foundation, Department of Defense, Department of Energy, and the National Institute of Standards and Technology, as well as by private sources.

Master of Science in Computer Science
The Master of Science in Computer Science program is designed to provide breadth of understanding in the core topics of computer science, in-depth advanced material, and a range of topics in the research areas of the faculty. A balance of theory and practice is presented, preparing students to perform cutting edge research as well as training students to become practicing computer scientists or software engineers in business, industry, or government. A thesis option is available to prepare students for doctoral studies or other research-oriented career paths.

Doctorate in Computer Science
Students enrolled in the PhD in Computer Science program are expected to become an expert in a research area in computer science or its interdisciplinary field with other disciplines. They are expected to conduct research in considerable depth, and make substantial contributions through creative research and serious scholarship. The program is designed for students to ensure core knowledge of the fundamental computer science areas and to conduct bleeding edge research at the forefront of a selected area. Students are prepared for leadership careers in research and education in computer science and interdisciplinary work using computer science.

Additional Information

For more information about these programs, visit the College of Computing & Informatics' website (http://drexel.edu/cci).

Master of Science in Computer Science

General Requirements

Students must complete a minimum of 45.0 graduate credits for the MS degree. All students are required to submit a plan of study form with a Graduate Advisor (http://drexel.edu/cci/resources/current-students/graduate-professional-development/advising) at the beginning of their studies. Significant changes to the plan of study should be discussed with a Graduate Advisor.

Precore Classes

Precore classes may only count towards the degree requirement listed below as free electives with approval from a Graduate Advisor (http://drexel.edu/cci/resources/current-students/graduate-professional-development/advising). Precore courses are intended for students without adequate CS background. The material in these courses is considered prerequisite knowledge for all other graduate CS courses.

- CS 520 Foundations of Computer Science
- CS 571 Programming Tools and Environments

Core Requirements		18.0
Students must take 1 course marked "Core Candidate" from each of the 6 categories below. There are 2 Core Candidate courses in each category.		
Theory		
CS 521	Data Structures and Algorithms I (Core Candidate)	
CS 522	Data Structures and Algorithms II	
CS 525	Theory of Computation (Core Candidate)	
CS 620	Advanced Data Structure and Algorithms	
CS 621	Approximation Algorithms	
CS 623	Computational Geometry	
Intelligent Systems		
CS 500	Database Theory (Core Candidate)	
CS 510	Introduction to Artificial Intelligence (Core Candidate)	
CS 511	Robot Laboratory	
CS 610	Advanced Artificial Intelligence	
CS 611	Game Artificial Intelligence	
CS 612	Knowledge-based Agents	
CS 613	Machine Learning	
Programming Systems		
CS 550	Programming Languages (Core Candidate)	
CS 575	Software Design (Core Candidate)	
CS 576	Dependable Software Systems	
CS 650	Program Generation and Optimization	
CS 675	Reverse Software Engineering	
CS 676	Parallel Programming	
Computer Systems		
CS 543	Operating Systems (Core Candidate)	
CS 544	Computer Networks (Core Candidate)	
CS 643	Advanced Operating Systems	
CS 645	Network Security	
CS 647	Distributed Systems Software	
Vision and Graphics		
CS 536	Computer Graphics (Core Candidate)	
CS 537	Interactive Computer Graphics	
CS 558	Game Engine Programming	
CS 583	Introduction to Computer Vision (Core Candidate)	
CS 634	Advanced Computer Vision	
CS 636	Advanced Computer Graphics	
Applications		

CS 530	Developing User Interfaces (Core Candidate)	
CS 540	High Performance Computing (Core Candidate)	
CS 567	Applied Symbolic Computation	
CS 590	Privacy	
CS 630	Cognitive Systems	
CS 668	Computer Algebra I	
CS 669	Computer Algebra II	

Breadth Requirements — 9.0

Students must take an additional 3 courses from the remaining courses above, spanning at least 2 of the listed categories.

Depth Requirements — 6.0

Students are required to complete at least 2 600- or 700-level Computer Science (CS) courses beyond the breadth requirement. The CS 690 Independent Study course may be taken if approved by the College.

| CS 690 | Course CS 690 Not Found | |

Additional Graduate-Level Courses — 6.0

Two additional graduate level courses are required. These courses are typically 600- or 700-level Computer Science (CS) courses. Graduate courses may be taken from outside the department, if on the list of approved external courses, and may include CS 690 Independent Study and CS 997 Research in Computer Science, if approved by the College.

| CS 690 | Course CS 690 Not Found | |
| CS 997 | Research in Computer Science | |

CS 520 and CS 571 may only be used to fulfill the additional course requirement with permission of the College. Any course not explicitly listed above, including independent study and research courses, must be approved by the College.

| CS 520 | Computer Science Foundations | |
| CS 571 | Programming Tools and Environments | |

Other courses, such as intermediate 500-level and special topics, may also qualify for fulfilling this requirement. Students must check with their advisor to see if this is the case, and have these courses approved by the College. Any course offered by another department that is not on the list of approved external courses must be approved by the College, or it will not count towards the degree.

Thesis or Non-Thesis Option — 6.0

Thesis Option

Usually students pursuing a Master's Thesis will first do 3.0 research credits (CS 690 or CS 997) to obtain background knowledge required by the thesis topic. It is the responsibility of the student to find a thesis supervisor.

CS 690	Course CS 690 Not Found	
CS 997	Research in Computer Science	
CS 898	Master's Thesis	

Non-thesis Option

The non-thesis option requires 2 additional 600- or 700-level Computer Science (CS) courses taken in place of the 6.0 thesis credits.

Total Credits — **45.0**

PhD in Computer Science

Core Requirements — 18.0

Students must take 1 course marked "Core Candidate" from each of the 6 categories below. There are 2 Core Candidate courses in each category.

Theory

CS 521	Data Structures and Algorithms I (Core Candidate)	
CS 525	Theory of Computation (Core Candidate)	
CS 522	Data Structures and Algorithms II	
CS 620	Advanced Data Structure and Algorithms	
CS 621	Approximation Algorithms	
CS 623	Computational Geometry	

Intelligent Systems

CS 500	Database Theory (Core Candidate)	
CS 510	Introduction to Artificial Intelligence (Core Candidate)	
CS 511	Robot Laboratory	
CS 610	Advanced Artificial Intelligence	
CS 611	Game Artificial Intelligence	
CS 612	Knowledge-based Agents	
CS 613	Machine Learning	

Programming Systems

CS 550	Programming Languages (Core Candidate)	
CS 575	Software Design (Core Candidate)	
CS 576	Dependable Software Systems	
CS 650	Program Generation and Optimization	
CS 675	Reverse Software Engineering	
CS 676	Parallel Programming	

Computer Systems

CS 543	Operating Systems (Core Candidate)	
CS 544	Computer Networks (Core Candidate)	
CS 643	Advanced Operating Systems	
CS 645	Network Security	
CS 647	Distributed Systems Software	

Vision and Graphics

CS 536	Computer Graphics (Core Candidate)	
CS 583	Introduction to Computer Vision (Core Candidate)	
CS 537	Interactive Computer Graphics	
CS 558	Game Engine Programming	
CS 634	Advanced Computer Vision	
CS 636	Advanced Computer Graphics	

Applications

CS 530	Developing User Interfaces (Core Candidate)	
CS 540	High Performance Computing (Core Candidate)	
CS 567	Applied Symbolic Computation	
CS 590	Privacy	
CS 630	Cognitive Systems	
CS 668	Computer Algebra I	
CS 669	Computer Algebra II	

Breadth Requirement — 12.0

Students must take another 4 intermediate and advanced courses from the remaining courses above, spanning at least 3 of the listed course categories while earning at least a grade of B in each course.

Depth Requirement	18.0

Students are required to complete at least 18.0 credits of CS courses beyond the Breadth Requirement. These courses should be 600- or 700-level courses. Course selection must be approved by the student's research advisor. The department will periodically offer topics courses, typically run in a seminar fashion, on current research areas of interest to faculty. As part of the Depth Requirements, 3.0 out of the 18.0 credits, but no more than 9.0 credits, are to be Independent Study work (CS 690).

Plan of Study

Upon entering the PhD program, each student will be assigned an Graduate Advisor, and with the help of the Advisor will develop and file a plan of study (which can be brought up to date when necessary). The plan of study should be filed with the Graduate Advisor no later than the end of the first term.

Qualifying Requirements

PhD student must pass each of the six core courses selected as part of the "Core Requirements" (one "Core Candidate" course from each of the listed categories) with a grade B+ or higher. If a student fails to meet this minimum grade requirement, he or she may either (1) take the other "Core Candidate" course in the same category and obtain a grade of B + of higher; (2) retake the same course at the next offering; or (3) retake the final exam of the same course with permission by the instructor, if deemed appropriate by the instructor and the College. Normally, a student is expected to satisfy this requirement by the end of the student's first year. These requirements, including the remedial actions, must be completed by the end of the student's second year. Transfer credits may count towards these requirements subject to course instructor approval of the syllabus for the transferred course.

Candidacy Exam

The Computer Science candidacy examination serves to define the student's research domain and to evaluate the student's knowledge and understanding of various fundamental and seminal results in that domain. At this point the student is expected to be able to read, understand, analyze, and explain advanced technical results in a specialized area of computer science at an adequate level of detail. The candidacy examination will evaluate those abilities using a defined set of published manuscripts. The student will prepare a written summary of the contents of the material, present the summary orally, and answer questions about the material. The examination committee will evaluate the written summary, the oral presentation, and the student's answers.

Thesis Proposal

After completing the candidacy examination successfully, the PhD candidate must prepare a thesis proposal that outlines, in detail, the specific problems that will be solved in the PhD dissertation. The quality of the research proposal should be at the level of, for example, a peer-reviewed proposal to a federal funding agency, or a publishable scientific paper. The candidate is responsible for sending the research proposal to the PhD committee two weeks before the oral presentation. The PhD committee need not be the same as the candidacy exam committee, but it follows the same requirements and must be approved by the Office of Graduate Studies. The oral presentation involves a 30-minute presentation by the candidate followed by an unspecified period during

which the committee will ask questions. After the question and answer period, the candidate will be asked to leave the room and the committee will determine if the research proposal has been accepted. The research proposal can be repeated at most once.

Thesis Defense

After completing the research proposal successfully, the PhD candidate must conduct the necessary research and publish the results in a PhD dissertation. The dissertation must be submitted to the PhD committee two weeks prior to the oral defense. The oral presentation involves a 45-minute presentation by the candidate, open to the public, followed by an unspecified period during which the committee will ask questions. The question-and-answer period is not open to the public. After the question and answer period, the candidate will be asked to leave the room and the committee will determine if the candidate has passed or failed the examination. The candidate will be granted one more chance to pass the final defense if (s)he fails it the first time. Paperwork selecting the thesis committee and indicating the results of the thesis defense must be filed with the College of Computing & Informatics (http://www.drexel.edu/cci) and the Graduate College (http://www.drexel.edu/graduatestudies).

Dual MS Degree Opportunities

Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program, to work simultaneously on two CCI master's degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first CCI master's degree when requesting admission to the second CCI master's degree. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees.

To satisfy dual degree requirements for the MSCS and another degree the plan of study must include the following: mandatory core, flexible core, breadth and one depth course for a total of 30.0 credits. To obtain a dual degree you must have a minimum of 60 credits, thesis and research credits will be in excess of the 30.0 credits required by MSCS. The dual degree for MSCS students is only available to on-campus students. Please contact your advisor (http://drexel.edu/cci/resources/current-students/graduate-professional-development/advising) for more information on program requirements as some CCI master's degree combinations may require additional prerequisites.

The dual master's student must complete the Change of Curriculum and Status form (http://www.drexel.edu/~/media/Files/graduatestudies/forms/Change_of_Curriculum_and_Status.ashx?la=en) and obtain approvals from both graduate advisors. Final approval is granted by the Office of Graduate Studies. The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree) forms.

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu) is a learning enterprise, advancing the University's academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through four physical locations, including W. W. Hagerty Library, Hahnemann Library, Queen Lane Library and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics

students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, systems engineering, health informatics, information systems, and technology. Resources are available online at library.drexel.edu or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/about/w-w-hagerty).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

iCommons

Located in Room 106 of the Rush Building, the College's iCommons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, more collaborative space for its students and a furnished common area. There is a fully equipped conference room for student use with a 42" display and videoconferencing capabilities. The iCommons provides technical support to students, faculty, and administrative staff. In addition, the staff provides audio-visual support for all presentation classrooms within the Rush Building. Use of the iCommons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the iCommons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge CASE and project management software for usage in the iCommons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as "DreamSpark" which allows students free access to a wide array of Microsoft software titles and operating systems.

CCI students can access Drexel's mail server from within the iCommons. The iCommons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University's network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

Rush Building

The Rush Building houses on-campus classes, CCI administrative offices (academic advising, admissions, faculty, etc.) and the iCommons computer lab (open to all CCI students). The building holds 6 classrooms equipped for audio-visual presentation. These rooms typically contain a networked PC, HD video player, ceiling mounted projectors, and other equipment for presentations and demonstrations. Four of these classrooms are fully equipped to function as laptop computing labs for networking, programming and database-related projects.

In 2013, CCI redesigned its Information Technology Laboratory, located in the Rush Building, in support of the undergraduate degree program in information technology. This lab consists of enterprise class information technology hardware that students would encounter in industry positions. The hardware includes 20 high powered workstations that are available to students and specialized networking lab simulation software. The hardware is networked and reconfigurable utilizing multiple virtual technologies as needed for the various classes the laboratory supports.

In addition a special system has been built into to the classroom to allow for conversion into a standard laptop computing lab utilizing motorized monitor lifts that allow the monitors and keyboards to recess into the desk.

Cyber Learning Center

The Cyber Learning Center, located in University Crossings, provides consulting and other learning resources for students taking computer science classes. It is staffed by graduate and undergraduate computer science students in the College of Computing & Informatics.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, across Drexel's main campus including: the Auerbach and Berger Families Cybersecurity Laboratory, Drexel Health and Risk Communication Lab, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), Geometric and Intelligent Computing Laboratory (GICL), High Performance Computing Laboratory (SPIRAL), Privacy, Security and Automation Laboratory (PSAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College's research web page.

Alumni Garden

The Rush Building's Alumni Garden provides additional collaborative space for students, faculty, professional staff and alumni. The Garden features wireless networking, tables with built-in power outlets, accessible covered patio and balconies and a bicycle rack. The Alumni Garden (http://cci.drexel.edu/about/our-facilities/rush-building/rush-alumni-garden-request-for-use.aspx) may be reserved for Drexel events.

University Crossings

CCI also has on campus classrooms, administrative offices and faculty offices at University Crossings 100, located at the corner of JFK and Market Streets. The building houses a student computer lab (featuring workstations and laptop plug-in stations, arranged in pods, to encourage collaboration among CCI students), as well as several classrooms with video-conference enabled technology and media projection capabilities. Its Cyber Learning Center provides consulting and other learning resources for students taking computer science classes within the College. University Crossings is also home to several of the College's research groups and laboratories (http://cci.drexel.edu/research).

3401 Market Street

3401 Market Street houses faculty offices and doctoral student workspaces. It also is home to College research groups such as the Applied Informatics Group (http://cci.drexel.edu/about/our-facilities/other-cci-facilities.aspx), and University initiatives such as the Drexel University Cybersecurity Institute (http://cci.drexel.edu/cybersecurity). The Institute's newly opened Auerbach and Berger Families Cybersecurity Laboratory serves as University's first training facility dedicated to identifying challenges and discovering solutions in the areas of cyber infrastructure protection and incident response.

One Drexel Plaza

One Drexel Plaza at 30th and Market Streets houses CCI faculty offices and on campus classes via the Computing & Security Technology program.

Computer Science Faculty

Yuan An, PhD (http://drexel.edu/cci/contact/Faculty/An-Yuan) *(University of Toronto, Canada)* Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

David Augenblick, MS (http://drexel.edu/cci/contact/Faculty/Augenblick-David) *(University of Pennsylvania)* Associate Teaching Professor. Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems

Marcello Balduccini, PhD (http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello) *(Texas Tech University)* Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

David Breen, PhD (http://drexel.edu/cci/contact/Faculty/Breen-David) *(Rensselaer Polytechnic Institute)* Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Yuanfang Cai, PhD (http://drexel.edu/cci/contact/Faculty/Cai-Yuanfang) *(University of Virginia)* Associate Professor. Formal software design modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD (http://drexel.edu/cci/contact/Faculty/Char-Bruce) *(University of California, Berkeley)* Professor. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed

Andrea Forte, PhD (http://drexel.edu/cci/contact/Faculty/Forte-Andrea) *(Georgia Institute of Technology)* Assistant Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy

Christopher Geib, PhD (http://drexel.edu/cci/contact/Faculty/Geib-Christopher) *(University of Pennsylvania)* Associate Professor. Decision making and reasoning under conditions of uncertainty, planning, scheduling, constraint, based reasoning, human computer and robot interaction, probabilistic reasoning, computer network security, large scale process control, user interfaces

Rachel Greenstadt, PhD (http://drexel.edu/cci/contact/Faculty/Greenstadt-Rachel) *(Harvard University)* Associate Professor. Artificial intelligence, privacy, security, multi-agent systems, economics of electronic privacy and information security

Tony H. Grubesic, PhD (http://drexel.edu/cci/contact/Faculty/Grubesic-Tony) *(The Ohio State University)* Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Xiaohua Tony Hu, PhD (http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony) *(University of Regina, Canada)* Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Jeremy Johnson, PhD (http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy) *(Ohio State University)* Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Constantine Katsinis, PhD (http://drexel.edu/cci/contact/Faculty/Katsinis-Constantine) *(University of Rhode Island)* Associate Teaching Professor. Computer Security, network security, parallel computer architectures, mobile computing, information assurance, fault tolerant systems, image processing and pattern recognition

Weimao Ke, PhD (http://drexel.edu/cci/contact/Faculty/Ke-Weimao) *(University of North Carolina at Chapel Hill)* Assistant Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information

Geoffrey Mainland, PhD (http://drexel.edu/cci/contact/Faculty/Mainland-Geoffrey) *(Harvard University)* Assistant Professor. High-level programming languages and runtime support for non-general purpose computation

Spiros Mancoridis, PhD (http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros) *(University of Toronto)* Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Adelaida Alban Medlock, MS (http://drexel.edu/cci/contact/Faculty/Medlock-Adelaida-Alban) *(Drexel University)* Associate Teaching Professor. Introductory programming, computer science education

William Mongan, MS (http://drexel.edu/cci/contact/Faculty/Mongan-William) *(Drexel University)* Associate Teaching Professor. Service-oriented architectures, program comprehension, reverse engineering, software engineering, computer architecture, computer science education

Alan T. Murray, PhD (http://drexel.edu/cci/contact/Faculty/Murray-Alan) *(University of California, Santa Barbara)* Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

Ko Nishino, PhD (http://drexel.edu/cci/contact/Faculty/Nishino-Ko) *(University of Tokyo)* Director of Computing Graduate Affairs & Research, Associate Professor. Computer vision, computer graphics, analysis and synthesis of visual appearance

Krysztof Nowak, PhD (http://drexel.edu/cci/contact/Faculty/Nowak-Krzysztof) *(Washington University)* Associate Teaching Professor. Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education

Santiago Ontañón, PhD (http://drexel.edu/cci/contact/Faculty/Ontanon-Santiago) *(University of Barcelona)* Assistant Professor. Game AI, computer games, artificial intelligence, machine learning, case-based reasoning

Jeffrey L. Popyack, PhD (http://drexel.edu/cci/contact/Faculty/Popyack-Jeffrey) *(University of Virginia)* Professor. Operations research, stochastic

optimization, computational methods for Markov decisions processes, artificial intelligence, computer science education

William Regli, PhD (http://drexel.edu/cci/contact/Faculty/Regli-William) *(University of Maryland at College Park)* Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Jeffrey Salvage, MS (http://drexel.edu/cci/contact/Faculty/Salvage-Jeffrey) *(Drexel University)* Associate Teaching Professor. Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures

Dario Salvucci, PhD (http://drexel.edu/cci/contact/Faculty/Salvucci-Dario) *(Carnegie Mellon University)* Associate Dean for CCI Undergraduate Studies, Professor. Human computer interaction, cognitive science, machine learning, applications for driving

Aleksandra Sarcevic, PhD (http://drexel.edu/cci/contact/Faculty/Sarcevic-Aleksandra) *(Rutgers University)* Assistant Professor. Computer-supported cooperative work, human-computer interaction, healthcare informatics; crisis informatics; social analysis of information & communications technology (ICT)

Kurt Schmidt, MS (http://drexel.edu/cci/contact/Faculty/Schmidt-Kurt) *(Drexel University)* Associate Teaching Professor. Data structures, math foundation for computer science, programming tools, programming languages

Ali Shokoufandeh, PhD (http://drexel.edu/cci/contact/Faculty/Shokoufandeh-Ali) *(Rutgers University)* Professor. Theory of algorithms, graph theory, combinatorial optimization, computer vision

Erin Solovey, PhD (http://drexel.edu/cci/contact/Faculty/Solovey-Erin) *(Tufts University)* Assistant Professor. Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (http://drexel.edu/cci/contact/Faculty/Song-Il-Yeol) *(Louisiana State University)* PhD Program Director, Professor.Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration

Julia Stoyanovich, PhD (http://drexel.edu/cci/contact/Faculty/Stoyanovich-Julia) *(Columbia University)* Assistant Professor. Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Brian Stuart, PhD (http://drexel.edu/cci/contact/Faculty/Stuart-Brian) *(Purdue University)* Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD (http://drexel.edu/cci/contact/Faculty/Vokolos-Filippos) *(Polytechnic University)* Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Christopher C. Yang, PhD (http://drexel.edu/cci/contact/Faculty/Yang-Christopher) *(University of Arizona, Tucson)* Associate Professor.

Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Maxwell Young, PhD (http://drexel.edu/cci/contact/Faculty/Young-Maxwell) *(University of Waterloo)* Assistant Professor. Algorithms for decentralized networks that yield provable guarantees with respect to fault tolerance and performance

Digital Curation Specialist

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Programs (CIP) code: 25.0103
Standard Occupational Classification (SOC) code: 25-4011

About the Program

Digital Curation Specialist Certificate program focuses on the active management and preservation of digital resources throughout their lifecycle, supporting the needs of current and future researchers. The rapid expansion of digital information in all disciplines has created a growing need for information professionals who can plan and implement projects to create, select, maintain, preserve, provide access to, and add value to digital resources in a variety of institutional settings.

This Certificate meets the needs of students planning careers in a wide range of settings and complements the concentrations in Digital Libraries and Archival Studies. The Certificate addresses the growing importance of digital information in all environments.

Students will take the following courses required for the Certificate:

INFO 560	Introduction to Archives I	3.0
INFO 753	Introduction to Digital Curation	3.0
INFO 756	Digital Preservation	3.0
Select one from the following (Technology courses):		3.0
INFO 605	Introduction to Database Management	
INFO 633	Information Visualization	
INFO 653	Digital Libraries	
INFO 658	Information Architecture	
INFO 755	Electronic Records Management	
Select one from the following (Content add-value courses):		3.0
INFO 555	Introduction to Geographic Information Systems	
INFO 622	Content Representation	
INFO 661	Cataloging Special Materials	
INFO 662	Metadata and Resource Description	
Total Credits		**15.0**

Digital Libraries Specialist Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1334
Standard Occupational Classification (SOC) Code: 25-4021

The Digital Libraries Specialist certificate program is designed for professionals already holding a master's degree from an ALA-accredited program or a graduate degree closely related to this specialization. This specialization covers a range of topics in digital resources, collections and services.

The program must be completed within five years.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/post-masters-specialist-program).

Required Courses

INFO 552	Introduction to Web Design for Information Organizations	3.0
INFO 653	Digital Libraries	3.0
INFO 657	Digital Library Technologies	3.0
Select two courses from the following:		6.0
INFO 605	Introduction to Database Management	
INFO 608	Human-Computer Interaction	
INFO 622	Content Representation	
INFO 624	Information Retrieval Systems	
INFO 658	Information Architecture	
INFO 662	Metadata and Resource Description	
INFO 740	Digital Reference Services	
INFO 756	Digital Preservation	
Total Credits		**15.0**

Information Studies

Major: Information Studies
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 11.0401
Standard Occupational Classification (SOC) code: 15-1111

About the Program

The College of Computing & Informatics' on-campus PhD in Information Studies program educates interdisciplinary professionals in the fields of information services, studies and systems. The main focus of the program is on research that increases the benefits of information science and technology for all sectors of society.

Purpose and Scope

The program is not based on the accumulation of credits but represents a high level of scholarly achievement in both supervised and independent study and research. There are few fixed program requirements, and the master's degree is not a prerequisite for the PhD. The doctoral program has two major goals: to allow students to acquire in-depth knowledge of a specialized area within the field of information science and technology and to prepare students for a career in which research is a basic element; whether that career is in administration, research, or teaching.

Opportunities

Most graduates move into academic programs, research and development (R&D) positions, or become high-level managers of information organizations in the private or public sectors.

Additional Information

For more information about this program, visit the College of Computing & Informatics' Doctoral Program in Information Studies (http://drexel.edu/cci/programs/graduate-programs/phd-information-studies) web page.

Degree Requirements

Coursework

The degree requires a minimum of 90.0 credits beyond the bachelor's degree for the PhD degree or 45.0 credits beyond an applicable MS degree. At least three consecutive terms of full-time resident doctoral study are required. Students may be admitted to the program for part-time study, but they must be formally accepted as doctoral students and must meet the residency requirement.

Courses are taken, under an approved plan of study, to ensure the development of competence in:

- Information science and technology broadly construed
- One or more domains of study
- Research methodology

Advancement to Candidacy

To measure proficiencies in research and to assess students' mastery of their chosen area of study, students maintain a portfolio that is reviewed on a regular basis. Candidacy is awarded based on satisfactory reviews and the presentation of a scholarly document reviewing the literature and developing research questions in the student's dissertation area.

Dissertation

The dissertation must be an original scholarly contribution to the field of information science and technology that will demonstrate the student's capacity to conduct research. The final defense of the dissertation completes the program.

For a sample plan of study and more information about the degree, visit the College of Computing & Informatics' Doctoral Program in Information Studies (http://drexel.edu/cci/programs/graduate-programs/phd-information-studies) web page.

College of Computing & Informatics Computer Science Faculty

David Augenblick, MS *(University of Pennsylvania) Associate Teaching Professor.* Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems

Marcello Balduccini, PhD *(Texas Tech University) Senior Research Scientist, Assistant Research Professor, Applied Informatics Group.* Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

David Breen, PhD *(Rensselaer Polytechnic Institute) Associate Professor & Deputy Director, Center for Visual & Decision Informatics.* Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Yuanfang Cai, PhD *(University of Virginia) Associate Professor.* Formal software design modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD *(University of California, Berkeley) Professor.* Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed computation

Christopher Geib, PhD *(University of Pennsylvania) Associate Professor.* Decision making and reasoning under conditions of uncertainty, planning, scheduling, constraint, based reasoning, human computer and robot interaction, probabilistic reasoning, computer network security, large scale process control, user interfaces

Rachel Greenstadt, PhD *(Harvard University) Associate Professor*. Artificial intelligence, privacy, security, multi-agent systems, economics of electronic privacy and information security

Jeremy Johnson, PhD *(Ohio State University) Professor.* Computer algebra, parallel computations, algebraic algorithms, scientific computing

Constantine Katsinis, PhD *(University of Rhode Island) Associate Teaching Professor.* Computer Security, network security, parallel computer architectures, mobile computing, information assurance, fault tolerant systems, image processing and pattern recognition

Geoffrey Mainland, PhD *(Harvard University) Assistant Professor.* High-level programming languages and runtime support for non-general purpose computation

Spiros Mancoridis, PhD *(University of Toronto) Interim Dean & Professor.* Software engineering, software security, code analysis, evolutionary computation

Adelaida Alban Medlock, MS *(Drexel University) Associate Teaching Professor.* Introductory programming, computer science education

William Mongan, MS *(Drexel University) Associate Teaching Professor.* Service-oriented architectures, program comprehension, reverse engineering, software engineering, computer architecture, computer science education

Ko Nishino, PhD *(University of Tokyo) Associate Professor & Associate Department Head for Graduate Affairs.* Computer vision, computer graphics, analysis and synthesis of visual appearance

Krysztof Nowak, PhD *(Washington University) Associate Teaching Professor.* Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education

Santiago Ontañón, PhD *(University of Barcelona) Assistant Professor.* Game AI, computer games, artificial intelligence, machine learning, case-based reasoning

Jeffrey L. Popyack, PhD *(University of Virginia) Professor.* Operations research, stochastic optimization, computational methods for Markov decisions processes, artificial intelligence, computer science education

William Regli, PhD *(University of Maryland at College Park) Professor.* Artificial intelligence, computer graphics, engineering design and Internet computing

Jeffrey Salvage, MS *(Drexel University) Teaching Professor.* Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures

Dario Salvucci, PhD *(Carnegie Mellon University) Professor & Department Head, Computer Science.* Human computer interaction, cognitive science, machine learning, applications for driving

Kurt Schmidt, MS *(Drexel University) Associate Teaching Professor.* Data structures, math foundation for computer science, programming tools, programming languages

Ali Shokoufandeh, PhD *(Rutgers University) Professor & Senior Associate Dean of Research.* Theory of algorithms, graph theory, combinatorial optimization, computer vision

Erin Solovey, PhD *(Tufts University) Assistant Professor.* Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Julia Stoyanovich, PhD *(Columbia University) Assistant Professor.* Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Brian Stuart, PhD *(Purdue University) Associate Teaching Professor.* Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD *(Polytechnic University) Associate Teaching Professor.* System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Maxwell Young, PhD *(University of Waterloo) Assistant Professor.* Algorithms for decentralized networks that yield provable guarantees with respect to fault tolerance and performance.

Emeritus Faculty

Thomas T. Hewett, PhD *(University of Illinois) Professor Emeritus of Psychology and of Computer Science, Departments of Psychology and of Computer Science.* Cognitive engineering of computing support systems

for a variety of creative expert knowledge workers and computing support for teaching-learning activities

Health Informatics

Major: Health Informatics
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 51.2706
Standard Occupational Classification (SOC) code: 15-1111

About the Program

The College of Computing & Informatics' Master of Science in Health Informatics (MSHI) provides students with the ability to use information systems (including knowledge processing methods as well as information and communication technologies) efficiently and responsibly in order to improve health outcomes in such varied settings as clinical medicine, nursing, and public health in primary and hospital care, industry, government and academia.

This program, housed at the College of Computing & Informatics and delivered online, is a collaborative effort with the College of Nursing and Health Professions and Drexel University College of Medicine.

Graduates of the MS in Health Informatics program will be prepared to fill the rapidly growing demand for professionals who understand healthcare, information systems, and technology.

Learning Objectives

Specific learning outcomes for program graduates include the following:

- Articulate the ways in which data, information, and knowledge are used to solve health problems from the individual to the population level.
- Apply theories, methods, and processes for the generation, storage, retrieval, use, management, and sharing of healthcare data, information, and knowledge.
- Apply, adapt, and validate informatics concepts and approaches as they relate to specific biomedical and healthcare problems.
- Select relevant concepts and techniques from the social sciences to solve problems in health informatics.
- Work collaboratively across disciplines to define, discuss, and resolve health problems from the individual to the population level.
- Analyze the ethical and policy issues related to biomedical and healthcare informatics.

Additional Information

For more information about this program, visit the College of Computing & Informatics' MS in Health Informatics (http://drexel.edu/cci/programs/graduate-programs/ms-in-health-informatics) web page.

Degree Requirements

The curriculum is based around contemporary health issues and has been designed to help students understand the current landscape of health informatics and how information, technology and people relate and intersect in healthcare environments. Because health informatics is an interdisciplinary field, all students will complete a common core of 10 courses (30 quarter hours) from the College of Computing & Informatics

before choosing from a suite of specialized electives offered by the College of Computing & Informatics or other Colleges at Drexel University.

The College recommends that all students take INFO 648 in their first term, if possible. Students wishing to take two classes their first term should consider enrolling in INFO 530 as well.

Students are strongly encouraged to consult with their graduate advisor when registering for courses.

Required Courses

INFO 530	Foundations of Information Systems	3.0
INFO 605	Introduction to Database Management	3.0
INFO 608	Human-Computer Interaction	3.0
INFO 614	Distributed Computing and Networking	3.0
INFO 620	Information Systems Analysis and Design	3.0
INFO 638	Software Project Management	3.0
INFO 648	Healthcare Informatics	3.0
INFO 712	Information Assurance	3.0
INFO 731	Organization & Social Issues in Healthcare Informatics	3.0
INFO 732	Healthcare Informatics: Planning & Evaluation	3.0
Track Courses		
In addition to these requirements, students complete either Track 1 or Track 2 courses (listed below)		15.0
Total Credits		**45.0**

Track 1: Students Admitted Without a Health-Related Background

Students who lack a health-related background are required to take at least 9.0 credits from the following list of electives, and must complete 1 term clinical experience in a healthcare setting.

Electives

Select three of the following:		9.0
INFO 517	Principles of Cybersecurity	
INFO 526	Information, Innovation & Technology in Advanced Nursing Practice	
INFO 555	Introduction to Geographic Information Systems	
INFO 733	Public Health Informatics	
INFO 753	Introduction to Digital Curation	
NURS 531	Epidemiology in Action: Tracking Health & Disease	
NURS 532	Evaluation of Health Outcomes	
NURS 557	Leadership and Stewardship in the Health Professions	
NURS 558	Economics of Healthcare Management & Policy	
NURS 564	The Business of Healthcare	
RSCH 519	Introduction to Biostatistics	
RSCH 523	Methods for Health Research	
BUSN 651	Healthcare Business Practice I: Foundations	
BUSN 652	Healthcare Business Practice II	
BUSN 653	Healthcare Business Practice III: Capstone	
Clinical Experience		
INFO 896	Clinical Experience	3.0
Free Elective		

One free elective		3.0
Total Credits		**15.0**

Track 2: Students Admitted With a Health-Related Background

Students who have a clinical background and who wish to develop additional expertise in a specific area may take 3 additional courses (9.0 credits) from the following list. Students intending to sit for Certification in Nursing Informatics should consult the requirements for that credential to determine the additional eligibility requirements.

Electives

Select three of the following:		9.0
INFO 517	Principles of Cybersecurity	
INFO 526	Information, Innovation & Technology in Advanced Nursing Practice	
INFO 555	Introduction to Geographic Information Systems	
INFO 606	Advanced Database Management	
INFO 610	Analysis of Interactive Systems	
INFO 611	Design of Interactive Systems	
INFO 622	Content Representation	
INFO 624	Information Retrieval Systems	
INFO 634	Data Mining	
INFO 733	Public Health Informatics	
INFO 753	Introduction to Digital Curation	
NURS 531	Epidemiology in Action: Tracking Health & Disease	
NURS 532	Evaluation of Health Outcomes	
NURS 557	Leadership and Stewardship in the Health Professions	
NURS 558	Economics of Healthcare Management & Policy	
NURS 564	The Business of Healthcare	
RSCH 519	Introduction to Biostatistics	
RSCH 523	Methods for Health Research	
BUSN 651	Healthcare Business Practice I: Foundations	
BUSN 652	Healthcare Business Practice II	
BUSN 653	Healthcare Business Practice III: Capstone	
Free Electives		
Two free electives		6.0
Total Credits		**15.0**

Dual MS Degree Opportunities

Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program, to work simultaneously on two CCI master's degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first CCI master's degree when requesting admission to the second CCI master's degree. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees. Please contact your advisor (http://drexel.edu/cci/resources/current-students/graduate-professional-development/advising) for more information on program requirements as some CCI master's degree combinations may require additional pre-requisites.

The dual master's student must complete the Change of Curriculum and Status form (http://www.drexel.edu/%7E/media/Files/graduatestudies/forms/Change_of_Curriculum_and_Status.ashx?la=en) and obtain approvals from both graduate advisors. Final approval is granted by the Office of Graduate Studies. The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree) forms.

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.2706
Standard Occupational Classification (SOC) Code: 15-1111

Certificate in Healthcare Informatics

This online certificate program is designed for working professionals who want to increase their knowledge of how health information technology can be deployed to improve health outcomes. Clinicians and information professionals gain a broad knowledge of contemporary health informatics, and the complex social and organizational issues surrounding this major change in healthcare. Students also acquire skills in planning and evaluation.

Graduates of the program may advance their careers in health IT-related responsibilities or explore new opportunities in this growing field. Students enrolled in any master's program in the College of Computing & Informatics may also complete the certificate in healthcare informatics.

Required Courses

INFO 648	Healthcare Informatics	3.0
INFO 731	Organization & Social Issues in Healthcare Informatics	3.0
INFO 732	Healthcare Informatics: Planning & Evaluation	3.0
Total Credits		**9.0**

Additional Information

For additional information about this program, visit the Certificate in Healthcare Informatics (http://www.drexel.com/online-degrees/information-sciences-degrees/cert-hci) page at Drexel University Online.

Facilities

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu) is a learning enterprise, advancing the University's academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through four physical locations, including W. W. Hagerty Library, Hahnemann Library, Queen Lane Library and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, systems engineering, health informatics, information systems,

and technology. Resources are available online at library.drexel.edu or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/about/w-w-hagerty).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

iCommons

Located in Room 106 of the Rush Building, the College's iCommons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, more collaborative space for its students and a furnished common area. There is a fully equipped conference room for student use with a 42" display and videoconferencing capabilities. The iCommons provides technical support to students, faculty, and administrative staff. In addition, the staff provides audio-visual support for all presentation classrooms within the Rush Building. Use of the iCommons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the iCommons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge CASE and project management software for usage in the iCommons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as "DreamSpark" which allows students free access to a wide array of Microsoft software titles and operating systems.

CCI students can access Drexel's mail server from within the iCommons. The iCommons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University's network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

Rush Building

The Rush Building houses on campus classes, CCI administrative offices (academic advising, admissions, faculty, etc.) and the iCommons computer lab (open to all CCI students). The building holds 6 classrooms equipped for audio-visual presentation. These rooms typically contain a networked PC, HD video player, ceiling mounted projectors, and other equipment for presentations and demonstrations. Four of these classrooms are fully equipped to function as laptop computing labs for networking, programming and database-related projects.

In 2013, CCI redesigned its Information Technology Laboratory, located in the Rush Building, in support of the undergraduate degree program in information technology. This lab consists of enterprise class information technology hardware that students would encounter in industry positions. The hardware includes 20 high powered workstations that are available to students and specialized networking lab simulation software. The hardware is networked and reconfigurable utilizing multiple virtual technologies as needed for the various classes the laboratory supports. In addition a special system has been built into to the classroom to allow for conversion into a standard laptop computing lab utilizing motorized monitor lifts that allow the monitors and keyboards to recess into the desk.

Cyber Learning Center

The Cyber Learning Center, located in University Crossings, provides consulting and other learning resources for students taking computer science classes. It is staffed by graduate and undergraduate computer science students in the College of Computing & Informatics.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, across Drexel's main campus including: the Auerbach and Berger Families Cybersecurity Laboratory, Drexel Health and Risk Communication Lab, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), Geometric and Intelligent Computing Laboratory (GICL), High Performance Computing Laboratory (SPIRAL), Privacy, Security and Automation Laboratory (PSAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College's research web page.

Alumni Garden

The Rush Building's Alumni Garden provides additional collaborative space for students, faculty, professional staff and alumni. The Garden features wireless networking, tables with built-in power outlets, accessible covered patio and balconies and a bicycle rack. The Alumni Garden (http://cci.drexel.edu/about/our-facilities/rush-building/rush-alumni-garden-request-for-use.aspx) may be reserved for Drexel events.

University Crossings

CCI also has on campus classrooms, administrative offices and faculty offices at University Crossings 100, located at the corner of JFK and Market Streets. The building houses a student computer lab (featuring workstations and laptop plug-in stations, arranged in pods, to encourage collaboration among CCI students), as well as several classrooms with video-conference enabled technology and media projection capabilities. Its Cyber Learning Center provides consulting and other learning resources for students taking computer science classes within the College. University Crossings is also home to several of the College's research groups and laboratories (http://cci.drexel.edu/research).

3401 Market Street

3401 Market Street houses faculty offices and doctoral student workspaces. It also is home to College research groups such as the Applied Informatics Group (http://cci.drexel.edu/about/our-facilities/other-cci-facilities.aspx), and University initiatives such as the Drexel University Cybersecurity Institute (http://cci.drexel.edu/cybersecurity). The Institute's newly opened Auerbach and Berger Families Cybersecurity Laboratory serves as University's first training facility dedicated to identifying challenges and discovering solutions in the areas of cyber infrastructure protection and incident response.

One Drexel Plaza

One Drexel Plaza at 30th and Market Streets houses CCI faculty offices and on campus classes via the Computing & Security Technology program.

Health Informatics Faculty

Larry Alexander, PhD (http://drexel.edu/cci/contact/Faculty/Alexander-Larry) *(University of Pennsylvania)* Research Professor & Interim Senior Associate Dean for CCI Research and Scholarly Activities. Large scale modeling and simulation, pattern recognition, future of information technology

Yuan An, PhD (http://drexel.edu/cci/contact/Faculty/An-Yuan) *(University of Toronto, Canada)* Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

Marcello Balduccini, PhD (http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello) *(Texas Tech University)* Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

Ellen Bass, PhD (http://drexel.edu/cci/contact/Faculty/Bass-Ellen) *(Georgia Institute of Technology)* Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (http://drexel.edu/cci/contact/Faculty/Booker-Jennifer) *(Drexel University)* Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

David Breen, PhD (http://drexel.edu/cci/contact/Faculty/Breen-David) *(Rensselaer Polytechnic Institute)* Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Chaomei Chen, PhD (http://drexel.edu/cci/contact/Faculty/Chen-Chaomei) *(University of Liverpool)* Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction

Prudence W. Dalrymple, PhD (http://drexel.edu/cci/contact/Faculty/Dalrymple-Prudence) *(University of Wisconsin-Madison)* Director, Institute for Healthcare Informatics, Research and Teaching Professor. User-centered information behaviors, particularly in the health arena, health informatics, evidence based practice, education for the information professions and evaluation, and translation of research into practice

M. Carl Drott, PhD (http://drexel.edu/cci/contact/Faculty/Drott-Carl) *(University of Michigan)* Associate Professor. Systems analysis techniques, Web usage, competitive intelligence

Andrea Forte, PhD (http://drexel.edu/cci/contact/Faculty/Forte-Andrea) *(Georgia Institute of Technology)* Assistant Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy

Susan Gasson, PhD (http://drexel.edu/cci/contact/Faculty/Gasson-Susan) *(University of Warwick)* Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, Grounded Theory

Jane Greenberg, PhD (http://drexel.edu/cci/contact/Faculty/Greenberg-Jane) *(University of Pittsburgh)* Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Peter Grillo, PhD (http://drexel.edu/cci/contact/Faculty/Grillo-Peter) *(Temple University)* Associate Teaching Professor. Strategic applications of technology within organizations

Tony H. Grubesic, PhD (http://drexel.edu/cci/contact/Faculty/Grubesic-Tony) *(The Ohio State University)* Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Xiaohua Tony Hu, PhD (http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony) *(University of Regina, Canada)* Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Michael Khoo, PhD (http://drexel.edu/cci/contact/Faculty/Khoo-Michael) *(University of Colorado at Boulder)* Assistant Professor. The understandings and practices that users bring to their interactions with information systems, with a focus on the evaluation of digital libraries and educational technologies

Xia Lin, PhD (http://drexel.edu/cci/contact/Faculty/Lin-Xia) *(University of Maryland)* Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, object-oriented programming, information retrieval, information architecture, information-seeking behaviors in digital environments

Alan T. Murray, PhD (http://drexel.edu/cci/contact/Faculty/Murray-Alan) *(University of California, Santa Barbara)* Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

William Regli, PhD (http://drexel.edu/cci/contact/Faculty/Regli-William) *(University of Maryland at College Park)* Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Lorraine Richards, PhD (http://drexel.edu/cci/contact/Faculty/Richards-Lorraine) *(University of North Carolina)* Assistant Professor. Archives, digital curation, electronic records management, information technology and digital collections, cloud computing and record keeping, management of information organizations

Michelle L. Rogers, PhD (http://drexel.edu/cci/contact/Faculty/Rogers-Michelle) *(University of Wisconsin-Madison)* Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety

Erin Solovey, PhD (http://drexel.edu/cci/contact/Faculty/Solovey-Erin) *(Tufts University)* Assistant Professor. Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (http://drexel.edu/cci/contact/Faculty/Song-Il-Yeol) *(Louisiana State University)* PhD Program Director, Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration

Julia Stoyanovich, PhD (http://drexel.edu/cci/contact/Faculty/Stoyanovich-Julia) *(Columbia University)* Assistant Professor. Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Rosina Weber, PhD (http://drexel.edu/cci/contact/Faculty/Weber-Rosina) *(Federal University of Santa Catarina)* Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Erija Yan, PhD (http://drexel.edu/cci/contact/Faculty/Yan-Erjia) *(Indiana University)* Assistant Professor. Network Science, Information Analysis and Retrieval, Scholarly Communication Methods and Applications

Christopher C. Yang, PhD (http://drexel.edu/cci/contact/Faculty/Yang-Christopher) *(University of Arizona, Tucson)* Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Information Systems

Major: Information Systems
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 11.0401
Standard Occupational Classification (SOC) code: 11-3021

About the Program

The College of Computing & Informatics' Master of Science in Information Systems (MSIS) prepares students for both the technical and real-world aspects of creating and managing an information system. The program, which is offered both online and on campus, part-time and full-time, focuses on a systems engineering approach, evaluating client needs and technological advances in order to create solutions that take into account the latest advances and theories in the field.

Learning Objectives

Graduates of the MS in Information Systems program are prepared to assume leadership and management positions designing, developing, and delivering innovative technological solutions to information problems in a variety of contexts. Their preparation encompasses the knowledge and abilities required to:

- Use a human-centered approach to analyze information needs and design solutions to meet those needs.

- Lead or contribute substantially to a team in developing information technology products and services.

- Evaluate, compare, and select from alternative and emerging information technologies.

- Communicate with technical and non-technical audiences about information technology concepts and stakeholder needs.

- Contribute substantially to an information technology plan for an organization.

- Explain information technology uses, benefits, and ethical and global issues for individuals and organizations.

Additional Information

For more information about this program, visit the College of Computing & Informatics' MS in Information Systems (http://drexel.edu/cci/programs/graduate-programs/ms-in-information-systems) web page.

Degree Requirements

Required Courses

INFO 530	Foundations of Information Systems	3.0
INFO 532	Software Development	3.0
INFO 605	Introduction to Database Management	3.0
INFO 608	Human-Computer Interaction	3.0
INFO 614	Distributed Computing and Networking	3.0
INFO 620	Information Systems Analysis and Design	3.0
INFO 630	Evaluation of Information Systems	3.0
INFO 638	Software Project Management	3.0
INFO 646	Information Systems Management	3.0
Distribution Requirements		**12.0**
Select four of the following:		
INFO 540	Perspectives on Information Systems	
INFO 606	Advanced Database Management	
INFO 607	Applied Database Technologies	
INFO 610	Analysis of Interactive Systems	
INFO 611	Design of Interactive Systems	
INFO 612	Knowledge Base Systems	
INFO 613	XML and Databases	
INFO 616	Social and Collaborative Computing	
INFO 617	Introduction to System Dynamics	
INFO 622	Content Representation	
INFO 624	Information Retrieval Systems	
INFO 625	Cognition and Information Retrieval	
INFO 626	Language Processing	
INFO 627	Requirements Engineering and Management	
INFO 628	Information Systems Implementation	
INFO 629	Concepts in Artificial Intelligence	
INFO 631	Information Technology Integration	
INFO 633	Information Visualization	
INFO 634	Data Mining	
INFO 636	Software Engineering Process I	
INFO 637	Software Engineering Process II	
INFO 648	Healthcare Informatics	
INFO 653	Digital Libraries	
INFO 655	Intro to Web Programming	
INFO 657	Digital Library Technologies	
INFO 658	Information Architecture	
INFO 710	Information Forensics	
INFO 712	Information Assurance	
INFO 714	Information Systems Auditing	

INFO 731	Organization & Social Issues in Healthcare Informatics	
INFO 755	Electronic Records Management	
INFO 782	Issues in Informatics	
Free Electives [*]		6.0
Total Credits		**45.0**

[*] Courses in the distribution course set that students do not take to meet the distribution requirement may be taken as free electives. All other masters-level INFO courses may be taken as free electives. MSIS students may not take courses designated as doctoral-level courses.

Dual MSIS and MSLIS Option (https://nextcatalog.drexel.edu/graduate/collegeofinformationscienceandtechnology/informationsystems)

63.0 quarter credits

About the Program

The dual master's degree program, consisting of a Master of Science in Library and Information Science MSLIS and a Master of Science in Information Systems (MSIS), combines the Library and Information Science program focus on selecting, organizing, managing and accessing information resources to meet user information needs with the MS in Information System program skills in creating and managing the databases, interfaces, and information systems that connect users with the information they are seeking. Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program to work simultaneously on two master's degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first degree when requesting admission to the second.

Learning Objectives

Graduates of the dual program are prepared to assume leadership and management positions designing, developing, and delivering innovative technological solutions to information problems in a variety of contexts; evaluating information services and products; and managing organizations that facilitate access to recorded knowledge. Students who pursue this path greatly increase their ability to compete in today's cutting-edge information marketplace, where the importance of digitized information resources and the needs of organizations and companies to provide networked access to these resources via intranet gateways and knowledge management systems is steadily increasing. Their preparation encompasses the knowledge and abilities required to:

- Explain the foundational principles, professional ethics and values, and social context within which various information professionals work.
- Design and deliver library and information services and/or products using appropriate resources in libraries, archives and/or other information organizations.
- Analyze the structure, description, and bibliographic control of literatures.
- Develop appropriate information-seeking strategies to select information resources for given audiences.

- Retrieve information in various formats and from various technologies/platforms.
- Communicate knowledge and skills related to accessing, evaluating and using information, information resources and/or information technology.
- Manage information organizations using appropriate strategies and approaches.
- Use a human-centered approach to analyze information needs and design solutions to meet those needs.
- Lead or contribute substantially to a team in developing information technology products and services.
- Evaluate, compare, and select from alternative and emerging information technologies.
- Communicate with technical and non-technical audiences about information technology concepts and stakeholder needs.
- Contribute substantially to an information technology plan for an organization.
- Explain information technology uses, benefits, and ethical and global issues for individuals and organizations.

Required Courses

INFO 530	Foundations of Information Systems	3.0
MS(LIS) Required Courses		
INFO 515	Introduction to Research in Information Organizations	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 522	Information Access & Resources	3.0
INFO 521	Information Users and Services	3.0
INFO 640	Managing Information Organizations	3.0
MSIS Required Courses		
INFO 532	Software Development	3.0
INFO 605	Introduction to Database Management	3.0
INFO 608	Human-Computer Interaction	3.0
INFO 614	Distributed Computing and Networking	3.0
INFO 620	Information Systems Analysis and Design	3.0
INFO 630	Evaluation of Information Systems	3.0
INFO 638	Software Project Management	3.0
INFO 646	Information Systems Management	3.0
Distribution Requirements		
Completion of at least four of the following courses is required for the degree. Additional courses from this list may be taken as electives.		12.0
INFO 540	Perspectives on Information Systems	
INFO 606	Advanced Database Management	
INFO 607	Applied Database Technologies	
INFO 610	Analysis of Interactive Systems	
INFO 611	Design of Interactive Systems	
INFO 612	Knowledge Base Systems	
INFO 613	XML and Databases	
INFO 616	Social and Collaborative Computing	
INFO 622	Content Representation	
INFO 624	Information Retrieval Systems	
INFO 625	Cognition and Information Retrieval	
INFO 627	Requirements Engineering and Management	
INFO 628	Information Systems Implementation	
INFO 631	Information Technology Integration	

INFO 633	Information Visualization	
INFO 634	Data Mining	
INFO 636	Software Engineering Process I	
INFO 637	Software Engineering Process II	
INFO 648	Healthcare Informatics	
INFO 653	Digital Libraries	
INFO 655	Intro to Web Programming	
INFO 657	Digital Library Technologies	
INFO 658	Information Architecture	
INFO 710	Information Forensics	
INFO 712	Information Assurance	
INFO 714	Information Systems Auditing	
INFO 731	Organization & Social Issues in Healthcare Informatics	
INFO 755	Electronic Records Management	
INFO 782	Issues in Informatics	
Free Electives *		9.0
Total Credits		**63.0**

*   Courses in the distribution course set that students do not take to meet the distribution requirement may be taken as free electives. All other master's level INFO courses may be taken as free electives. MS/MS(LIS) students may not take courses designated as doctoral level or courses INFO 861, INFO 863, or INFO 998.

Facilities

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu) is a learning enterprise, advancing the University's academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through four physical locations, including W. W. Hagerty Library, Hahnemann Library, Queen Lane Library and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, systems engineering, health informatics, information systems, and technology. Resources are available online at library.drexel.edu or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/about/w-w-hagerty).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

iCommons

Located in Room 106 of the Rush Building, the College's iCommons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, more collaborative space for its students and a furnished common area. There is a fully equipped conference room for student use with a 42"

display and videoconferencing capabilities. The iCommons provides technical support to students, faculty, and administrative staff. In addition, the staff provides audio-visual support for all presentation classrooms within the Rush Building. Use of the iCommons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the iCommons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge CASE and project management software for usage in the iCommons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as "DreamSpark" which allows students free access to a wide array of Microsoft software titles and operating systems.

CCI students can access Drexel's mail server from within the iCommons. The iCommons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University's network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

Rush Building

The Rush Building houses on campus classes, CCI administrative offices (academic advising, admissions, faculty, etc.) and the iCommons computer lab (open to all CCI students). The building holds 6 classrooms equipped for audio-visual presentation. These rooms typically contain a networked PC, HD video player, ceiling mounted projectors, and other equipment for presentations and demonstrations. Four of these classrooms are fully equipped to function as laptop computing labs for networking, programming and database-related projects.

In 2013, CCI redesigned its Information Technology Laboratory, located in the Rush Building, in support of the undergraduate degree program in information technology. This lab consists of enterprise class information technology hardware that students would encounter in industry positions. The hardware includes 20 high powered workstations that are available to students and specialized networking lab simulation software. The hardware is networked and reconfigurable utilizing multiple virtual technologies as needed for the various classes the laboratory supports. In addition a special system has been built into to the classroom to allow for conversion into a standard laptop computing lab utilizing motorized monitor lifts that allow the monitors and keyboards to recess into the desk.

Cyber Learning Center

The Cyber Learning Center, located in University Crossings, provides consulting and other learning resources for students taking computer science classes. It is staffed by graduate and undergraduate computer science students in the College of Computing & Informatics.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, across Drexel's main campus including: the Auerbach and Berger Families Cybersecurity Laboratory, Drexel Health and Risk Communication Lab, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), Geometric and Intelligent Computing Laboratory (GICL), High Performance Computing Laboratory (SPIRAL), Privacy, Security and Automation Laboratory (PSAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research

Group (SERG), Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College's research web page.

Alumni Garden

The Rush Building's Alumni Garden provides additional collaborative space for students, faculty, professional staff and alumni. The Garden features wireless networking, tables with built-in power outlets, accessible covered patio and balconies and a bicycle rack. The Alumni Garden (http://cci.drexel.edu/about/our-facilities/rush-building/rush-alumni-garden-request-for-use.aspx) may be reserved for Drexel events.

University Crossings

CCI also has on campus classrooms, administrative offices and faculty offices at University Crossings 100, located at the corner of JFK and Market Streets. The building houses a student computer lab (featuring workstations and laptop plug-in stations, arranged in pods, to encourage collaboration among CCI students), as well as several classrooms with video-conference enabled technology and media projection capabilities. Its Cyber Learning Center provides consulting and other learning resources for students taking computer science classes within the College. University Crossings is also home to several of the College's research groups and laboratories (http://cci.drexel.edu/research).

3401 Market Street

3401 Market Street houses faculty offices and doctoral student workspaces. It also is home to College research groups such as the Applied Informatics Group (http://cci.drexel.edu/about/our-facilities/other-cci-facilities.aspx), and University initiatives such as the Drexel University Cybersecurity Institute (http://cci.drexel.edu/cybersecurity). The Institute's newly opened Auerbach and Berger Families Cybersecurity Laboratory serves as University's first training facility dedicated to identifying challenges and discovering solutions in the areas of cyber infrastructure protection and incident response.

One Drexel Plaza

One Drexel Plaza at 30th and Market Streets houses CCI faculty offices and on campus classes via the Computing & Security Technology program.

Information Systems Faculty

Larry Alexander, PhD (http://drexel.edu/cci/contact/Faculty/Alexander-Larry) *(University of Pennsylvania)* Research Professor & Interim Senior Associate Dean for CCI Research and Scholarly Activities. Large scale modeling and simulation, pattern recognition, future of information technology

Yuan An, PhD (http://drexel.edu/cci/contact/Faculty/An-Yuan) *(University of Toronto, Canada)* Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

Marcello Balduccini, PhD (http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello) *(Texas Tech University)* Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

Ellen Bass, PhD (http://drexel.edu/cci/contact/Faculty/Bass-Ellen) (*Georgia Institute of Technology)* Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (http://drexel.edu/cci/contact/Faculty/Booker-Jennifer) *(Drexel University)* Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

David Breen, PhD (http://drexel.edu/cci/contact/Faculty/Breen-David) *(Rensselaer Polytechnic Institute)* Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Yuanfang Cai, PhD (http://drexel.edu/cci/contact/Faculty/Cai-Yuanfang) *(University of Virginia)* Associate Professor. Formal software design modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD (http://drexel.edu/cci/contact/Faculty/Char-Bruce) *(University of California, Berkeley)* Professor. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed computation

Chaomei Chen, PhD (http://drexel.edu/cci/contact/Faculty/Chen-Chaomei) *(University of Liverpool)* Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction

Prudence W. Dalrymple, PhD (http://drexel.edu/cci/contact/Faculty/Dalrymple-Prudence) *(University of Wisconsin-Madison)* Director, Institute for Healthcare Informatics, Research and Teaching Professor. User-centered information behaviors, particularly in the health arena, health informatics, evidence based practice, education for the information professions and evaluation, and translation of research into practice

M. Carl Drott, PhD (http://drexel.edu/cci/contact/Faculty/Drott-Carl) *(University of Michigan)* Associate Professor. Systems analysis techniques, Web usage, competitive intelligence

Andrea Forte, PhD (http://drexel.edu/cci/contact/Faculty/Forte-Andrea) *(Georgia Institute of Technology)* Assistant Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy

Susan Gasson, PhD (http://drexel.edu/cci/contact/Faculty/Gasson-Susan) *(University of Warwick)* Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, Grounded Theory

Jane Greenberg, PhD (http://drexel.edu/cci/contact/Faculty/Greenberg-Jane) *(University of Pittsburgh)* Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Peter Grillo, PhD (http://drexel.edu/cci/contact/Faculty/Grillo-Peter) *(Temple University)* Associate Teaching Professor. Strategic applications of technology within organizations

Tony H. Grubesic, PhD (http://drexel.edu/cci/contact/Faculty/Grubesic-Tony) *(The Ohio State University)* Professor (Joint appointment in

the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Xiaohua Tony Hu, PhD (http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony) *(University of Regina, Canada)* Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Gregory W. Hislop, PhD (http://drexel.edu/cci/contact/Faculty/Hislop-Gregory) *(Drexel University)* Senior Associate Dean for Informatics and CCI Academic Affairs, Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization

Jeremy Johnson, PhD (http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy) *(Ohio State University)* Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Michael Khoo, PhD (http://drexel.edu/cci/contact/Faculty/Khoo-Michael) *(University of Colorado at Boulder)* Assistant Professor. The understandings and practices that users bring to their interactions with information systems, with a focus on the evaluation of digital libraries and educational technologies

Xia Lin, PhD (http://drexel.edu/cci/contact/Faculty/Lin-Xia) *(University of Maryland)* Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, object-oriented programming, information retrieval, information architecture, information-seeking behaviors in digital environments

Spiros Mancoridis, PhD (http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros) *(University of Toronto)* Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Alan T. Murray, PhD (http://drexel.edu/cci/contact/Faculty/Murray-Alan) *(University of California, Santa Barbara)* Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

William Regli, PhD (http://drexel.edu/cci/contact/Faculty/Regli-William) *(University of Maryland at College Park)* Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Lorraine Richards, PhD (http://drexel.edu/cci/contact/Faculty/Richards-Lorraine) *(University of North Carolina)* Assistant Professor. Archives, digital curation, electronic records management, information technology and digital collections, cloud computing and record keeping, management of information organizations

Michelle L. Rogers, PhD (http://drexel.edu/cci/contact/Faculty/Rogers-Michelle) *(University of Wisconsin-Madison)* Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety

Kurt Schmidt, MS (http://drexel.edu/cci/contact/Faculty/Schmidt-Kurt) *(Drexel University)* Associate Teaching Professor. Data structures, math foundation for computer science, programming tools, programming languages

Erin Solovey, PhD (http://drexel.edu/cci/contact/Faculty/Solovey-Erin) *(Tufts University)* Assistant Professor. Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (http://drexel.edu/cci/contact/Faculty/Song-Il-Yeol) *(Louisiana State University)* PhD Program Director, Professor.Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration

Julia Stoyanovich, PhD (http://drexel.edu/cci/contact/Faculty/Stoyanovich-Julia) *(Columbia University)* Assistant Professor. Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Brian Stuart, PhD (http://drexel.edu/cci/contact/Faculty/Stuart-Brian) *(Purdue University)* Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD (http://drexel.edu/cci/contact/Faculty/Vokolos-Filippos) *(Polytechnic University)* Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Rosina Weber, PhD (http://drexel.edu/cci/contact/Faculty/Weber-Rosina) *(Federal University of Santa Catarina)* Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Erija Yan, PhD (http://drexel.edu/cci/contact/Faculty/Yan-Erjia) *(Indiana University)* Assistant Professor. Network Science, Information Analysis and Retrieval, Scholarly Communication Methods and Applications

Christopher C. Yang, PhD (http://drexel.edu/cci/contact/Faculty/Yang-Christopher) *(University of Arizona, Tucson)* Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Library and Information Science

Major: Library and Information Science
Degree Awarded: Master of Science in Library and Information Science (MSLIS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 25.0101
Standard Occupational Classification (SOC) code: 25-4021

About the Program

NOTE: Effective Fall 2015, students are no longer being accepted into the School Library Media Concentration.

The College of Computing & Informatics' Master of Science in Library and Information Science (MSLIS) provides students with a foundation in a wide variety of information professions. The program addresses the contexts in which librarians and other information professionals work, the systems and services they provide, and the uses of new and emerging technologies in the field.

Learning Objectives

Graduates of the MSLIS program are prepared to assume leadership positions in designing, executing, and evaluating information services and products and in managing organizations that facilitate access to recorded knowledge. Their preparation enables them to gain the knowledge and abilities required to:

- Explain the foundational principles, professional ethics and values, and social context within which various information professionals work.
- Design and deliver library and information services and/or products using appropriate resources in libraries, archives and/or other information organizations.
- Analyze the structure, description, and bibliographic control of literatures.
- Develop appropriate information-seeking strategies to select information resources for given audiences.
- Retrieve information in various formats and from various technologies/platforms.
- Communicate knowledge and skills related to accessing, evaluating and using information, information resources and/or information technology.
- Manage information organizations using appropriate strategies and approaches.

Accreditation

The College of Computing & Informatics is a member of the Association for Library and Information Science Education, and its MS program in Library and Information Science is accredited by the American Library Association.

Professional Affiliation for MS Students

Student groups include student chapters of the American Library Association, the Association for Information Science & Technology, the Progressive Librarians Guild, the Society of American Archivists, and the Special Libraries Association.

Additional Information

For more information about this program, visit the College of Computing & Informatics' MS in Library and Information Science (http://drexel.edu/cci/programs/graduate-programs/ms-in-library-and-information-science) web page.

Degree Requirements

The library and information science program assures students of a solid introduction to the field, a logical progression of coursework, and a wide variety of electives. All students are required to complete the six core courses, totaling 18.0 credits. Completion of the MSLIS program requires a total of 45.0 credits. Students may take any available INFO subject electives to complete their required number of credits in the program.

Students may declare a concentration in one of six areas: *archival studies, competitive intelligence and knowledge management, digital curation, digital libraries, library and information services, school library media** and *youth services.* These concentrations are optional and will appear on the student's transcript. Except for the school library media concentration, the concentrations consist of 5 courses, 3-4 required and 1-2 chosen from a limited list of courses relevant to the topic area. The remaining 12.0 credits are free electives, in which students can elect to take any other INFO courses that have not been taken as a concentration elective course.

In exceptional cases, a student with previous coursework in an ALA-accredited program or in an information science program may petition for exemption from one to three required courses. This petition should be made at the time of application to the College and should include both a detailed statement of the reasons for seeking exemption and a copy of the official transcript, including course descriptions.

*NOTE: Effective Fall 2015, students are no longer being accepted into the School Library Media Concentration.

Core Courses

INFO 515	Introduction to Research in Information Organizations	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 521	Information Users and Services	3.0
INFO 522	Information Access & Resources	3.0
INFO 530	Foundations of Information Systems	3.0
INFO 640	Managing Information Organizations	3.0
Free Electives		12.0
Concentration Courses (see below)		15.0
Total Credits		**45.0**

Concentrations

Archival Studies

The concentration in archival studies focuses on the practice and theory of managing collections of records and papers in a variety of archival settings, including governmental agencies, libraries, historical societies, corporations, not-for-profit organizations, museums, and religious institutions. The course content within this concentration provides the educational component required for post-graduate certification by the Academy of Certified Archivists. This concentration may also be of interest to students planning careers in academic and special libraries.

Required Courses [*]

INFO 560	Introduction to Archives I	3.0
INFO 561	Introduction to Archives II	3.0
INFO 750	Archival Access Systems	3.0
Select two of the following courses:		6.0
INFO 751	Archival Appraisal	
INFO 755	Electronic Records Management	
INFO 756	Digital Preservation	
Total Credits		**15.0**

Competitive Intelligence and Knowledge Management

This concentration focuses on information needs and knowledge management in special library, corporate, and other organizational settings.

Required Courses [‡]

INFO 643	Information Services In Organizations	3.0
INFO 644	Knowledge Assets Management in Organizations	3.0
INFO 678	Competitive Intelligence	3.0

CI & KM Concentration Electives

Select two of the following courses:		6.0
INFO 605	Introduction to Database Management	
INFO 677	Resources in Business	
INFO 680	US Government Information	
INFO 681	Legal Research	
INFO 755	Electronic Records Management	
Total Credits		**15.0**

Digital Curation

Digital Curation focuses on the active management and preservation of digital resources throughout the lifecycle, supporting the needs of current and future researchers. The rapid expansion of digital information in all disciplines has created a growing need for information professionals who can plan and implement projects to create, select, maintain, preserve, provide access, and add value to digital resources in a variety of institutional settings.

This concentration meets the needs of students planning careers in a wide range of settings and complements the concentrations in Digital Libraries and Archival Studies. The concentration addresses the growing importance of digital information in all environments.

Core Required Courses

INFO 560	Introduction to Archives I	3.0
INFO 753	Introduction to Digital Curation	3.0
INFO 756	Digital Preservation	3.0
Select one from the following (Technology courses):		3.0
INFO 605	Introduction to Database Management	
INFO 633	Information Visualization	
INFO 653	Digital Libraries	
INFO 658	Information Architecture	
INFO 755	Electronic Records Management	
Select one from the following (Content add-value courses):		3.0
INFO 555	Introduction to Geographic Information Systems	
INFO 622	Content Representation	
INFO 661	Cataloging Special Materials	
INFO 662	Metadata and Resource Description	
Total Credits		**15.0**

Digital Libraries

This concentration covers a range of topics in digital resources, collections and services. It can serve as a bridging concentration accessible to MSIS students; several courses are part of the MSIS curriculum.

Required Courses [†]

INFO 552	Introduction to Web Design for Information Organizations	3.0
INFO 653	Digital Libraries	3.0
INFO 657	Digital Library Technologies	3.0

Select two of the following courses:		6.0
INFO 555	Introduction to Geographic Information Systems	
INFO 605	Introduction to Database Management	
INFO 608	Human-Computer Interaction	
INFO 622 or INFO 662	Content Representation [*] Metadata and Resource Description	
INFO 624	Information Retrieval Systems	
INFO 633	Information Visualization	
INFO 658	Information Architecture	
INFO 740	Digital Reference Services	
INFO 753	Introduction to Digital Curation	
INFO 755	Electronic Records Management	
INFO 756	Digital Preservation	
Total Credits		**15.0**

[*]   Students may receive credit toward the Digital Libraries concentration by taking either INFO 622 or INFO 662, but both cannot be taken to fulfill the requirements.

Library and Information Services

This is a generalist concentration that includes key professional skills and an orientation to both a work setting and a relevant elective.

Required Courses

INFO 552	Introduction to Web Design for Information Organizations	3.0
INFO 660	Cataloging and Classification	3.0
INFO 665	Collection Management	3.0
Library and Information Services Concentration electives		6.0
Students select one Work Setting course (and) either one Public Services course (or) one Technical Services course		

Work Settings

INFO 650	Public Library Service	
INFO 651	Academic Library Service	
INFO 745	Special Libraries and Information Centers	

Public Services

INFO 649	Library Programming	
INFO 682	Storytelling	
INFO 740	Digital Reference Services	
INFO 672-681 (specialized reference courses INFO 672, 673, 674, 675, 677, 680, and 681)		

Technical Services

INFO 622	Content Representation	
INFO 662	Metadata and Resource Description	
INFO 663	Library Technical Services	
INFO 664	Library Automation	
Total Credits		**15.0**

School Library Media (SLiM)

The School Library Media concentration is designed for students who wish to work in K-12 school library programs in both public and private schools. Designed to prepare graduates to be eligible for certification as school librarians by the Pennsylvania Department of Education (PDE), the program meets the requirements of the State of Pennsylvania and

provides a strong basis for seeking certification in other states as well. In most instances, students will be required to complete a supervised field study to be eligible for certification.

Three course sequences are available within the concentration: one for students who have *no prior teaching certification* from PDE; one for students who have had *prior teaching certification from PDE* and who wish to add school librarian certification to their credentials; and one for students *with ALA-accredited master's degrees* who wish to seek school librarian certification from PDE.

A grade of B or higher in each course is required to maintain eligibility for PDE Certification. For PDE Certification, students also submit relevant PRAXIS scores to the University. All courses in the School Library Media concentration, with the exception of INFO 891 and INFO 892, are offered online; INFO 891 and INFO 892 include both field experience and an online component. Sites may be arranged across the United S tates. Students seeking certification outside of Pennsylvania should check on requirements in their own jurisdictions. Only students (1) who hold current certification as teachers from the Pennsylvania Department of Education (POE) or (2) who earn PDE Certification as part of the Drexel program can be formally endorsed by the University as completers of Drexel's state approved program.

For full course sequences, visit http://drexel.edu/~/media/Files/cci/docs/cs/Grad/slim_handbookv4.ashx?la=en

School Library Media (SLiM) concentration (For students without PDE certification or other teaching certification)

INFO 515	Introduction to Research in Information Organizations	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 521	Information Users and Services	3.0
INFO 522	Information Access & Resources	3.0
INFO 525	School Library Programs & Services	3.0
INFO 530	Foundations of Information Systems	3.0
INFO 552	Introduction to Web Design for Information Organizations	3.0
INFO 640	Managing Information Organizations	3.0
INFO 660	Cataloging and Classification	3.0
INFO 665	Collection Management	3.0
INFO 683	Resources for Children	3.0
INFO 684	Resources for Young Adults	3.0
INFO 688	Instructional Role for the Information Specialist	3.0
INFO 891	Twelve-Week School Library and Media Center Field Study	6.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 546 or EDEX 566	Literacy and Content Skill Development PreK-8 Literacy and Content Skill Development 7-12	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
Total Credits		**60.0**

School Library Media (SLiM) concentration (For students who already have PDE certification or other teaching certification)

INFO 515	Introduction to Research in Information Organizations	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 521	Information Users and Services	3.0
INFO 522	Information Access & Resources	3.0
INFO 525	School Library Programs & Services	3.0
INFO 530	Foundations of Information Systems	3.0
INFO 552	Introduction to Web Design for Information Organizations	3.0
INFO 640	Managing Information Organizations	3.0
INFO 660	Cataloging and Classification	3.0
INFO 665	Collection Management	3.0
INFO 683	Resources for Children	3.0
INFO 684	Resources for Young Adults	3.0
INFO 688	Instructional Role for the Information Specialist	3.0
INFO 892	Six-Week School Library and Media Center Field Study	3.0
Free elective		3.0
Total Credits		**45.0**

Youth Services

This concentration meets the interests of students planning public library careers with a focus on youth populations.

Required Courses

INFO 649	Library Programming	3.0
INFO 650	Public Library Service	3.0
INFO 683	Resources for Children	3.0
INFO 684	Resources for Young Adults	3.0
Select one of the following courses:		3.0
INFO 552	Introduction to Web Design for Information Organizations	
INFO 665	Collection Management	
INFO 682	Storytelling	
INFO 688	Instructional Role for the Information Specialist	
Total Credits		**15.0**

Dual MSIS and MSLIS Option (http://catalog.drexel.edu/graduate/collegeofinformationscienceandtechnology/informationsystems)

63.0 quarter credits

About the Program

The dual master's degree program, consisting of a Master of Science in Library and Information Science MSLIS and a Master of Science in Information Systems (MSIS), combines the Library and Information Science program focus on selecting, organizing, managing and accessing information resources to meet user information needs with the MS in Information System program skills in creating and managing the databases, interfaces, and information systems that connect users with the information they are seeking. Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program to work simultaneously on two master's degrees and to receive both upon graduation. To be eligible, graduate students must be

currently working on their first degree when requesting admission to the second.

Learning Objectives

Graduates of the dual program are prepared to assume leadership and management positions designing, developing, and delivering innovative technological solutions to information problems in a variety of contexts; evaluating information services and products; and managing organizations that facilitate access to recorded knowledge. Students who pursue this path greatly increase their ability to compete in today's cutting-edge information marketplace, where the importance of digitized information resources and the needs of organizations and companies to provide networked access to these resources via intranet gateways and knowledge management systems is steadily increasing. Their preparation encompasses the knowledge and abilities required to:

- Explain the foundational principles, professional ethics and values, and social context within which various information professionals work.
- Design and deliver library and information services and/or products using appropriate resources in libraries, archives and/or other information organizations.
- Analyze the structure, description, and bibliographic control of literatures.
- Develop appropriate information-seeking strategies to select information resources for given audiences.
- Retrieve information in various formats and from various technologies/ platforms.
- Communicate knowledge and skills related to accessing, evaluating and using information, information resources and/or information technology.
- Manage information organizations using appropriate strategies and approaches.
- Use a human-centered approach to analyze information needs and design solutions to meet those needs.
- Lead or contribute substantially to a team in developing information technology products and services.
- Evaluate, compare, and select from alternative and emerging information technologies.
- Communicate with technical and non-technical audiences about information technology concepts and stakeholder needs.
- Contribute substantially to an information technology plan for an organization.
- Explain information technology uses, benefits, and ethical and global issues for individuals and organizations.

Required Courses

INFO 530	Foundations of Information Systems	3.0

MS(LIS) Required Courses

INFO 515	Introduction to Research in Information Organizations	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 522	Information Access & Resources	3.0
INFO 521	Information Users and Services	3.0
INFO 640	Managing Information Organizations	3.0

MSIS Required Courses

INFO 532	Software Development	3.0
INFO 605	Introduction to Database Management	3.0

INFO 608	Human-Computer Interaction	3.0
INFO 614	Distributed Computing and Networking	3.0
INFO 620	Information Systems Analysis and Design	3.0
INFO 630	Evaluation of Information Systems	3.0
INFO 638	Software Project Management	3.0
INFO 646	Information Systems Management	3.0

Distribution Requirements

Completion of at least four of the following courses is required for the degree. Additional courses from this list may be taken as electives.		12.0
INFO 540	Perspectives on Information Systems	
INFO 606	Advanced Database Management	
INFO 607	Applied Database Technologies	
INFO 610	Analysis of Interactive Systems	
INFO 611	Design of Interactive Systems	
INFO 612	Knowledge Base Systems	
INFO 613	XML and Databases	
INFO 616	Social and Collaborative Computing	
INFO 622	Content Representation	
INFO 624	Information Retrieval Systems	
INFO 625	Cognition and Information Retrieval	
INFO 627	Requirements Engineering and Management	
INFO 628	Information Systems Implementation	
INFO 631	Information Technology Integration	
INFO 633	Information Visualization	
INFO 634	Data Mining	
INFO 636	Software Engineering Process I	
INFO 637	Software Engineering Process II	
INFO 648	Healthcare Informatics	
INFO 653	Digital Libraries	
INFO 655	Intro to Web Programming	
INFO 657	Digital Library Technologies	
INFO 658	Information Architecture	
INFO 710	Information Forensics	
INFO 712	Information Assurance	
INFO 714	Information Systems Auditing	
INFO 731	Organization & Social Issues in Healthcare Informatics	
INFO 755	Electronic Records Management	
INFO 782	Issues in Informatics	
Free Electives *		9.0
Total Credits		**63.0**

* Courses in the distribution course set that students do not take to meet the distribution requirement may be taken as free electives. All other master's level INFO courses may be taken as free electives. MS/MS(LIS) students may not take courses designated as doctoral level or courses INFO 861, INFO 863, or INFO 998.

Facilities

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu) is a learning enterprise, advancing the University's academic mission through serving as educators, supporting education and research, collaborating with

researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through four physical locations, including W. W. Hagerty Library, Hahnemann Library, Queen Lane Library and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, systems engineering, health informatics, information systems, and technology. Resources are available online at library.drexel.edu or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/about/w-w-hagerty).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

iCommons

Located in Room 106 of the Rush Building, the College's iCommons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, more collaborative space for its students and a furnished common area. There is a fully equipped conference room for student use with a 42" display and videoconferencing capabilities. The iCommons provides technical support to students, faculty, and administrative staff. In addition, the staff provides audio-visual support for all presentation classrooms within the Rush Building. Use of the iCommons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the iCommons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge CASE and project management software for usage in the iCommons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as "DreamSpark" which allows students free access to a wide array of Microsoft software titles and operating systems.

CCI students can access Drexel's mail server from within the iCommons. The iCommons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University's network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

Rush Building

The Rush Building houses on campus classes, CCI administrative offices (academic advising, admissions, faculty, etc.) and the iCommons computer lab (open to all CCI students). The building holds 6 classrooms equipped for audio-visual presentation. These rooms typically contain a networked PC, HD video player, ceiling mounted projectors, and other equipment for presentations and demonstrations. Four of these classrooms are fully equipped to function as laptop computing labs for networking, programming and database-related projects.

In 2013, CCI redesigned its Information Technology Laboratory, located in the Rush Building, in support of the undergraduate degree program in information technology. This lab consists of enterprise class information technology hardware that students would encounter in industry positions. The hardware includes 20 high powered workstations that are available to students and specialized networking lab simulation software. The hardware is networked and reconfigurable utilizing multiple virtual technologies as needed for the various classes the laboratory supports. In addition a special system has been built into to the classroom to allow for conversion into a standard laptop computing lab utilizing motorized monitor lifts that allow the monitors and keyboards to recess into the desk.

Cyber Learning Center

The Cyber Learning Center, located in University Crossings, provides consulting and other learning resources for students taking computer science classes. It is staffed by graduate and undergraduate computer science students in the College of Computing & Informatics.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, across Drexel's main campus including: the Auerbach and Berger Families Cybersecurity Laboratory, Drexel Health and Risk Communication Lab, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), Geometric and Intelligent Computing Laboratory (GICL), High Performance Computing Laboratory (SPIRAL), Privacy, Security and Automation Laboratory (PSAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College's research web page.

Alumni Garden

The Rush Building's Alumni Garden provides additional collaborative space for students, faculty, professional staff and alumni. The Garden features wireless networking, tables with built-in power outlets, accessible covered patio and balconies and a bicycle rack. The Alumni Garden (http://cci.drexel.edu/about/our-facilities/rush-building/rush-alumni-garden-request-for-use.aspx) may be reserved for Drexel events.

University Crossings

CCI also has on campus classrooms, administrative offices and faculty offices at University Crossings 100, located at the corner of JFK and Market Streets. The building houses a student computer lab (featuring workstations and laptop plug-in stations, arranged in pods, to encourage collaboration among CCI students), as well as several classrooms with video-conference enabled technology and media projection capabilities. Its Cyber Learning Center provides consulting and other learning resources for students taking computer science classes within the College. University Crossings is also home to several of the College's research groups and laboratories (http://cci.drexel.edu/research).

3401 Market Street

3401 Market Street houses faculty offices and doctoral student workspaces. It also is home to College research groups such as the Applied Informatics Group (http://cci.drexel.edu/about/our-facilities/other-cci-facilities.aspx), and University initiatives such as the Drexel University Cybersecurity Institute (http://cci.drexel.edu/cybersecurity). The Institute's newly opened Auerbach and Berger Families Cybersecurity Laboratory serves as University's first training facility dedicated to identifying

challenges and discovering solutions in the areas of cyber infrastructure protection and incident response.

One Drexel Plaza

One Drexel Plaza at 30th and Market Streets houses CCI faculty offices and on campus classes via the Computing & Security Technology program.

Library & Information Science Faculty

Denise E. Agosto, PhD (http://drexel.edu/cci/contact/Faculty/Agosto-Denise) *(Rutgers University)* Associate Professor. Information behavior, public libraries, social networks, gender, children and teens

Chaomei Chen, PhD (http://drexel.edu/cci/contact/Faculty/Chen-Chaomei) *(University of Liverpool)* Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction

Catherine D. Collins, PhD (http://drexel.edu/cci/contact/Faculty/Collins-Catherine) (*Indiana University)* Associate Teaching Professor. Knowledge management, collection development, management of information organizations, information sources and services, international development

Prudence W. Dalrymple, PhD (http://drexel.edu/cci/contact/Faculty/Dalrymple-Prudence) *(University of Wisconsin-Madison)* Director, Institute for Healthcare Informatics, Research and Teaching Professor. User-centered information behaviors, particularly in the health arena, health informatics, evidence based practice, education for the information professions and evaluation, and translation of research into practice

Susan E. Davis, PhD (http://drexel.edu/cci/contact/Faculty/Davis-Susan) *(University of Wisconsin-Madison)* Associate Teaching Professor. Archives and special collections management, organization of and access to archival records, archival education, leadership in professions

M. Carl Drott, PhD (http://drexel.edu/cci/contact/Faculty/Drott-Carl) *(University of Michigan)* Associate Professor. Systems analysis techniques, Web usage, competitive intelligence

Susan Gasson, PhD (http://drexel.edu/cci/contact/Faculty/Gasson-Susan) *(University of Warwick)* Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, Grounded Theory

Jane Greenberg, PhD (http://drexel.edu/cci/contact/Faculty/Greenberg-Jane) *(University of Pittsburgh)* Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Tony H. Grubesic, PhD (http://drexel.edu/cci/contact/Faculty/Grubesic-Tony) *(The Ohio State University)* Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Michael Khoo, PhD (http://drexel.edu/cci/contact/Faculty/Khoo-Michael) *(University of Colorado at Boulder)* Assistant Professor. The understandings and practices that users bring to their interactions with information systems, with a focus on the evaluation of digital libraries and educational technologies

Alison M. Lewis, PhD (http://drexel.edu/cci/contact/Faculty/Lewis-Alison) *(Temple University)* Associate Teaching Professor. Ethics of librarianship, collection development and services to humanists and social scientists

Xia Lin, PhD (http://drexel.edu/cci/contact/Faculty/Lin-Xia) *(University of Maryland)* Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, object-oriented programming, information retrieval, information architecture, information-seeking behaviors in digital environments

Gabriela Marcu, PhD (http://drexel.edu/cci/contact/Faculty/Marcu-Gabriela) *(Carnegie Mellon University)* Assistant Professor. Human-computer interaction, health informatics, action research, ethnography, user experience design, designing for social change, organizational information systems, ubiquitous computing, knowledge management

Linda S. Marion, PhD (http://drexel.edu/cci/contact/Faculty/Marion-Linda) *(Drexel University)* Associate Teaching Professor. Formal and informal communication, bibliometric studies of scholarly communication, diffusion of information, information use in the social sciences, academic and public libraries, information science education

Alan Murray, PhD (http://drexel.edu/cci/contact/Faculty/Murray-Alan) *(University of California, Santa Barbara)* Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

Delia Neuman, PhD (http://drexel.edu/cci/contact/Faculty/Neuman-Delia) *(The Ohio State University)* Director of the School Library Media Program, Professor. Learning in information-rich environments, instructional systems design, the use of media for learning, and school library media.

Jung-ran Park, PhD (http://drexel.edu/cci/contact/Faculty/Park-Jung-ran) *(University of Hawaii at Manoa)* Associate Professor. Knowledge organization and representation (cataloging and classification, metadata) computer-mediated communication, cross-cultural communication, multilingual information access, discourse, and pragmatics

Lorraine Richards, PhD (http://drexel.edu/cci/contact/Faculty/Richards-Lorraine) *(University of North Carolina)* Assistant Professor. Archives, digital curation, electronic records management, information technology and digital collections, cloud computing and record keeping, management of information organizations

Deborah Turner, PhD (http://drexel.edu/cci/contact/Faculty/Turner-Deborah) *(University of Washington)* Assistant Professor. Information behavior/interaction, management of information institutions, orality and information

Kristene Unsworth, PhD (http://drexel.edu/cci/contact/Faculty/Unsworth-Kristene) *(University of Washington)* Assistant Professor. Information policy, ethics, government information

Erija Yan, PhD (http://drexel.edu/cci/contact/Faculty/Yan-Erjia) (Indiana University) Assistant Professor. Network Science, Information Analysis and Retrieval, Scholarly Communication Methods and Applications

Valerie Ann Yonker, PhD (http://drexel.edu/cci/contact/Faculty/Yonker-Valerie-Ann) *(Drexel University)* Associate Teaching Professor. Human

service information systems, systems analysis and design, measurement in software evaluation, knowledge engineering

Howard D. White, PhD (http://drexel.edu/cci/contact/Emeritus-Faculty/White-Howard) *(University of California, Berkeley)* Visiting Research Professor, Professor Emeritus. Literature information systems, bibliometrics, research methods, collection development, online searching

Emeritus

Katherine W. McCain, PhD (http://drexel.edu/cci/contact/Emeritus-Faculty/McCain-Katherine) *(Drexel University)* Professor Emeritus. Scholarly communication, information production and use in the research process, development and structure of scientific specialties, diffusion of innovation, bibliometrics, evaluation of information retrieval systems

National Security Management

Major: National Security Management
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 43.0301
Standard Occupational Classification (SOC) code: 11-9161

About the Program

The College of Computing & Informatics' (CCI) Master of Science in National Security Management (MSNSM) involves an understanding of national and homeland security, policy, law, social, and technological environments. As such, modern national security management is an interdisciplinary field built upon the expertise of a wide variety of disciplines. The online MS in National Security Management uses a multidisciplinary approach to targeting advanced topics in security management, emergency management, information technology, risk management, law and policy.

National Security Management Student Outcomes

Specific learning outcomes for students in the MSNSM program include the following:

- To provide students with the methodological skills and competence required for the integration of a wide range of information and insights that make up the complex national security environment.
- To equip students with a comprehensive understanding of national, corporate and cybersecurity theories and practice, enabling them to remain integrally involved in national security issues.
- To provide students with the knowledge to enable them to understand and critique the choices of decision makers and eventually play a productive role in that process in governmental, quasi-governmental and private sectors.
- To acquaint students with the various academic perspectives in the field of national security and enhance their analytical abilities to deal with the questions, problems, challenges and dilemmas of modern national security affairs, including the ethical aspects of dealing with the challenges of crime, terrorism and other kinds of asymmetric warfare, such as cyber-attacks in democratic societies.
- To develop professionals and future leaders with the ability to help their organizations make sound decisions on dealing with national security, corporate security, risk, cybersecurity, law and policy.
- To provide the basis, in particular through the undertaking of a capstone project, but also through the undertaking of coursework,

for the development of critical analytical skills and application of academic knowledge, for further research within the area of National Security Management.

Certificates in National Security Management

Students not wishing to complete the full MS in National Security Management may take any of the following certificates:

- Homeland Security Certificate (p. 22)
- Intelligence Certificate (p. 23)
- Certificate in Cybersecurity, Law & Policy (p. 22)
- Continuity Management Certificate (p. 22)

Additional Information

Scott J. White, PhD
Associate Clinical Professor
(Tel) 215-895-0910
(Fax) 215-895-0962
sjw@drexel.edu

For additional information about this program, visit the College of Computing & Informatics' MS in National Security Management (http://drexel.edu/cci/programs/graduate-programs/ms-in-national-security-management) web page.

Degree Requirements

The MSNSM offers students the opportunity to develop and engage in a piece of systematic research in a selected area of national security management. The MSNSM is uniquely designed to be completed as a part-time program or as a full-time program.

With the successful completion of the Applied (Capstone) Project, the student will be granted the MSNSM (45.0 credit hours).

Students have 5 years to complete the MSNSM.

HSM 544	Introduction to Homeland Security	3.0
CST 604	Technology for Homeland Security	3.0
HSM 549	Terrorism and Homeland Security	3.0
INFO 719	Introduction to National Security Enterprise	3.0
CST 609	National Security Intelligence	3.0
CST 614	Counterintelligence	3.0
INFO 517	Principles of Cybersecurity	3.0
INFO 717	Cyber-Computer Crime Law	3.0
INFO 718	Cybersecurity, Law and Policy	3.0
HSM 644	Public Management in Crisis	3.0
HSM 645	Emergency Incident Risk Management	3.0
HSM 646	Infrastructure Disaster Recovery	3.0
NSM 710	Applied Project I	3.0
NSM 711	Applied Project II	3.0
NSM 712	Applied Project III	3.0
Total Credits		**45.0**

National Security Management Faculty

Larry Alexander, PhD (http://drexel.edu/cci/contact/Faculty/Alexander-Larry) *(University of Pennsylvania)* Research Professor & Interim Senior

Associate Dean for CCI Research and Scholarly Activities. Large scale modeling and simulation, pattern recognition, future of information technology

Yuan An, PhD (http://drexel.edu/cci/contact/Faculty/An-Yuan) *(University of Toronto, Canada)* Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

Marcello Balduccini, PhD (http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello) *(Texas Tech University)* Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

Ellen Bass, PhD (http://drexel.edu/cci/contact/Faculty/Bass-Ellen) *(Georgia Institute of Technology)* Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (http://drexel.edu/cci/contact/Faculty/Booker-Jennifer) *(Drexel University)* Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

David Breen, PhD (http://drexel.edu/cci/contact/Faculty/Breen-David) *(Rensselaer Polytechnic Institute)* Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Christopher Carroll, MS (http://drexel.edu/cci/contact/Faculty/Carroll-Chris) *(Drexel University)* Assistant Teaching Professor. Information security, computer networking and design, IT Infrastructure, server technology, information technology management

Chaomei Chen, PhD (http://drexel.edu/cci/contact/Faculty/Chen-Chaomei) *(University of Liverpool)* Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction

Prudence W. Dalrymple, PhD (http://drexel.edu/cci/contact/Faculty/Dalrymple-Prudence) *(University of Wisconsin-Madison)* Director, Institute for Healthcare Informatics, Research and Teaching Professor. User-centered information behaviors, particularly in the health arena, health informatics, evidence based practice, education for the information professions and evaluation, and translation of research into practice

M. Carl Drott, PhD (http://drexel.edu/cci/contact/Faculty/Drott-Carl) *(University of Michigan)* Associate Professor. Systems analysis techniques, Web usage, competitive intelligence

Andrea Forte, PhD (http://drexel.edu/cci/contact/Faculty/Forte-Andrea) (*Georgia Institute of Technology)* Assistant Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy

Susan Gasson, PhD (http://drexel.edu/cci/contact/Faculty/Gasson-Susan) (*University of Warwick)* Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in

boundary-spanning groups, human-centered design, social informatics, online learning communities, Grounded Theory

Christopher Geib, PhD (http://drexel.edu/cci/contact/Faculty/Geib-Christopher) (*University of Pennsylvania)* Associate Professor. Decision making and reasoning under conditions of uncertainty, planning, scheduling, constraint, based reasoning, human computer and robot interaction, probabilistic reasoning, computer network security, large scale process control, user interfaces

Jane Greenberg, PhD (http://drexel.edu/cci/contact/Faculty/Greenberg-Jane) *(University of Pittsburgh)* Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Rachel Greenstadt, PhD (http://drexel.edu/cci/contact/Faculty/Greenstadt-Rachel) *(Harvard University)* Associate Professor. Artificial intelligence, privacy, security, multi-agent systems, economics of electronic privacy and information security

Peter Grillo, PhD (http://drexel.edu/cci/contact/Faculty/Grillo-Peter) *(Temple University)* Associate Teaching Professor. Strategic applications of technology within organizations

Tony H. Grubesic, PhD (http://drexel.edu/cci/contact/Faculty/Grubesic-Tony) *(The Ohio State University)* Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Xiaohua Tony Hu, PhD (http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony) *(University of Regina, Canada)* Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Jeremy Johnson, PhD (http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy) *(Ohio State University)* Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Constantine Katsinis, PhD (http://drexel.edu/cci/contact/Faculty/Katsinis-Constantine) *(University of Rhode Island)* Associate Teaching Professor. Computer Security, network security, parallel computer architectures, mobile computing, information assurance, fault tolerant systems, image processing and pattern recognition

Michael Khoo, PhD (http://drexel.edu/cci/contact/Faculty/Khoo-Michael) *(University of Colorado at Boulder)* Assistant Professor. The understandings and practices that users bring to their interactions with information systems, with a focus on the evaluation of digital libraries and educational technologies

Xia Lin, PhD (http://drexel.edu/cci/contact/Faculty/Lin-Xia) *(University of Maryland)* Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, object-oriented programming, information retrieval, information architecture, information-seeking behaviors in digital environments

Spiros Mancoridis, PhD (http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros) *(University of Toronto)* Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Alan T. Murray, PhD (http://drexel.edu/cci/contact/Faculty/Murray-Alan) *(University of California, Santa Barbara)* Professor (Joint appointment in the School of Public Health). Geographic information science, urban,

regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

William Regli, PhD (http://drexel.edu/cci/contact/Faculty/Regli-William) *(University of Maryland at College Park)* Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Lorraine Richards, PhD (http://drexel.edu/cci/contact/Faculty/Richards-Lorraine) *(University of North Carolina)* Assistant Professor. Archives, digital curation, electronic records management, information technology and digital collections, cloud computing and record keeping, management of information organizations

Michelle L. Rogers, PhD (http://drexel.edu/cci/contact/Faculty/Rogers-Michelle) *(University of Wisconsin-Madison)* Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety

Erin Solovey, PhD (http://drexel.edu/cci/contact/Faculty/Solovey-Erin) *(Tufts University)* Assistant Professor. Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (http://drexel.edu/cci/contact/Faculty/Song-Il-Yeol) *(Louisiana State University)* PhD Program Director, Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration

Julia Stoyanovich, PhD (http://drexel.edu/cci/contact/Faculty/Stoyanovich-Julia) *(Columbia University)* Assistant Professor. Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Rosina Weber, PhD (http://drexel.edu/cci/contact/Faculty/Weber-Rosina) (*Federal University of Santa Catarina*) Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Scott White, PhD (http://drexel.edu/cci/contact/Faculty/White-Scott) (*University of Bristol*) Associate Teaching Professor. Homeland security, terrorism and intelligence analysis, and counter-terrorism & infrastructure protection

Erija Yan, PhD (http://drexel.edu/cci/contact/Faculty/Yan-Erjia) *(Indiana University)* Assistant Professor. Network Science, Information Analysis and Retrieval, Scholarly Communication Methods and Applications

Christopher C. Yang, PhD (http://drexel.edu/cci/contact/Faculty/Yang-Christopher) *(University of Arizona, Tucson)* Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Maxwell Young, PhD (http://drexel.edu/cci/contact/Faculty/Young-Maxwell) *(University of Waterloo)* Assistant Professor. Algorithms for decentralized networks that yield provable guarantees with respect to fault tolerance and performance

Software Engineering

Major: Software Engineering
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 14.0903
Standard Occupational Classification (SOC) code: 15-1132; 15-1133

About the Program

The College of Computing and Informatics' Master of Science in Software Engineering (MSSE) program was created in response to the growing importance of software to the national infrastructure and the rapid rise in demand for professional software engineers.

The multidisciplinary MS in Software Engineering program draws on the strengths of Drexel programs in computer science, engineering, and information science and technology, provides a curriculum that encompasses behavioral, managerial, and technical aspects of software engineering and attempts to synthesize—rather than differentiate—disciplinary paradigms and themes. The program is appropriate for students interested in a wide range of application domains.

All students in the program take a core curriculum that spans the scope of disciplinary areas relevant to the degree, thereby providing a common foundation for all students in the program. Students also elect an area of concentration, or track — a cohesive, more specialized set of courses that builds on the core to support each student's particular career interest. Three tracks are available: information science and technology, computer science, and engineering.

Additional Information

For more information about this program, please visit the College of Computing & Informatics' MS in Software Engineering (http://drexel.edu/cci/programs/graduate-programs/ms-in-software-engineering) web page.

Degree Requirements

Degree requirements vary by track. All students take the required six core courses (18.0 quarter credits).

Core Courses

Core courses cover topics that are essential for the practicing software engineer.

Computer Science Courses		
CS 575	Software Design	3.0
CS 576	Dependable Software Systems	3.0
Electrical and Computer Engineering Courses		
ECEC 500	Fundamentals Of Computer Hardware [*]	3.0
ECEC 600	Fundamentals of Computer Networks [*]	3.0
Information Science and Technology Courses		
INFO 627	Requirements Engineering and Management	3.0
INFO 638	Software Project Management	3.0
Total Credits		**18.0**

*   For students enrolled in the online program, INFO 631 Information Technology Integration may be substituted for ECEC 500, and CS 544 Computer Networks may be substituted for ECEC 600.

Tracks

Students in each track follow the policies determined by the respective College.

Information Science and Technology Track

This track supports students interested in applying software engineering to information systems problems in commercial organizations and other settings. The principal focus is the process by which user and system requirements are converted into cost-effective, maintainable software systems. This is complemented by a concern for defining, creating, understanding, and evaluating the full range of software life-cycle products. The track places particular emphasis on information systems methodologies such as human-computer interaction, requirements analysis, modeling, and validation, along with the use of off-the-shelf tools and components to assist in software processes.

Students in the information science and technology track take a total of nine track courses: four required track courses, three courses selected from the track distribution courses, and two courses selected from the distribution courses or other approved electives. This track requires a total of 45.0 credits, 18.0 of which are from the required core.

Required Courses		12.0
INFO 608	Human-Computer Interaction	
INFO 630	Evaluation of Information Systems	
INFO 636	Software Engineering Process I	
INFO 637	Software Engineering Process II	
Distribution Courses		**9.0**
Select three of the following:		
INFO 606	Advanced Database Management	
INFO 607	Applied Database Technologies	
INFO 610	Analysis of Interactive Systems	
INFO 611	Design of Interactive Systems	
INFO 620	Information Systems Analysis and Design	
INFO 631	Information Technology Integration	
INFO 646	Information Systems Management	
Two Elective Courses		**6.0**
Select two of the following:		
INFO 612	Knowledge Base Systems	
INFO 613	XML and Databases	
INFO 616	Social and Collaborative Computing	
INFO 617	Introduction to System Dynamics	
INFO 634	Data Mining	
Total Credits		**27.0**

Computer Science Track

Track Coordinator: Dr. Spiros Mancoridis, 215-895-6824, spiros@drexel.edu

The computer science track welcomes students who are interested in a variety of technical topics pertaining to the development of software systems such as databases, networks, operating systems, graphics and animation systems, compilers, expert systems, and systems for scientific computing. Students will use languages and apply techniques to specify, design, implement, test, and maintain software systems.

Students in the computer science track take nine courses in addition to the six core courses listed above (for a total of 15 courses). Of the nine additional courses, four courses must be from one of the five concentration areas, plus five electives must be graduate level CS courses and two may be fulfilled by any graduate level CS or INFO courses, except for INFO 605 and INFO 530.

Students in their final 3 quarters of study who have a 3.5 GPA or better may take a 9-credit project instead of 3 elective courses. To register for a project, the student must select a project advisor (a member of the CS faculty who is willing to supervise). The project is a large-scale software development effort in which students specify, design, implement, and test a significant software system.

Concentration Courses		12.0
Select four of the following:		
Computing Systems Concentration		
CS 500	Database Theory	
CS 540	High Performance Computing	
CS 543	Operating Systems	
CS 544	Computer Networks	
CS 643	Advanced Operating Systems	
CS 645	Network Security	
CS 647	Distributed Systems Software	
CS 675	Reverse Software Engineering	
CS 676	Parallel Programming	
CS 741	Computer Networks II	
CS 680	Special Topics in Computer Science (Computer Systems)	
Programming Languages Concentration		
CS 525	Theory of Computation	
CS 550	Programming Languages	
CS 551	Compiler Construction I	
CS 552	Compiler Construction II	
CS 650	Program Generation and Optimization	
CS 675	Reverse Software Engineering	
CS 676	Parallel Programming	
CS 680	Special Topics in Computer Science (Programming Languages)	
User Interface Software Concentration		
CS 530	Developing User Interfaces	
CS 536	Computer Graphics	
CS 630	Cognitive Systems	
CS 636	Advanced Computer Graphics	
CS 680	Special Topics in Computer Science (User Interface Software)	
Artificial Intelligence Concentration		
CS 510	Introduction to Artificial Intelligence	
CS 511	Robot Laboratory	
CS 610	Advanced Artificial Intelligence	
CS 612	Knowledge-based Agents	
CS 613	Machine Learning	

CS 680	Special Topics in Computer Science (Artificial Intelligence)

Theory and Scientific Computation Concentration

CS 520	Computer Science Foundations
CS 521	Data Structures and Algorithms I
CS 522	Data Structures and Algorithms II
CS 540	High Performance Computing
CS 567	Applied Symbolic Computation
CS 668	Computer Algebra I
CS 669	Computer Algebra II
CS 676	Parallel Programming
CS 680	Special Topics in Computer Science (Theory & Scientific Computation)

Total Credits	**12.0**

For additional information on the Computer Science Track, visit the College of Computing & Informatics' Master of Science in Software Engineering (https://www.cs.drexel.edu/graduate/msse) web page.

Engineering Track

Track Coordinator: Dr. Kapil Dandekar, 215-895-2228, dandekar@coe.drexel.edu

Students in this track pursue techniques to model engineering problems and offer software solutions. The courses in this track emphasize problems facing engineering industries including electrical, mechanical, environmental, chemical, and others. Systems modeling and simulation techniques will be used to solve these problems.

Students in this track take 27.0 or more credits of track courses in addition to the 18.0 credits of required core courses. Three computer engineering courses are required; the other courses are from one of five concentrations. A total of 45.0 approved graduate credits are required for the MSSE, including the 18.0 credits of core courses. Students opting for the Graduate Co-op Program (GCP) option are required to complete 51.0 approved credits, including 6.0 GCP credits.

For more information on curriculum requirements, visit the Department of Electrical and Computer Engineering's Graduate Student Guide (http://www.ece.drexel.edu/MSSE.html).

Sample Track Courses	27.0
Select nine of the following:	

Chemical Engineering Concentration

CHE 554	Process Systems Engineering
CHE 658	Advanced Process Design

Civil and Architectural Engineering Concentration

CIVE 501	Model Analysis of Structures
CIVE 605	Advanced Mechanics Of Material
CIVE 701	Structural Analysis I
CIVE 702	Structural Analysis II
CIVE 703	Structural Analysis III
CIVE 704	Behavior and Stability of Structural Members I

Electrical and Computer Engineering Concentration [*]

ECEC 511	Combinational Circuit Design
ECEC 512	Sequential Circuit Design
ECEC 513	Design for Testability
ECEC 621	High Performance Computer Architecture
ECEC 622	Parallel Computer Architecture
ECEC 623	Advanced Topics in Computer Architecture

Total Credits	**27.0**

[*] Any other ECE 500-level or above course may be eligible for credit for the Electrical and Computer Engineering concentration.

Dual MS Degree Opportunities

Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program, to work simultaneously on two CCI master's degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first CCI master's degree when requesting admission to the second CCI master's degree. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees. Please contact your advisor (http://drexel.edu/cci/resources/current-students/graduate-professional-development/advising) for more information on program requirements as some CCI master's degree combinations may require additional pre-requisites.

The dual master's student must complete the Change of Curriculum and Status form (http://www.drexel.edu/~/media/Files/graduatestudies/forms/Change_of_Curriculum_and_Status.ashx?la=en) and obtain approvals from both graduate advisors. Final approval is granted by the Office of Graduate Studies. The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree) forms.

Facilities

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu) is a learning enterprise, advancing the University's academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through four physical locations, including W. W. Hagerty Library, Hahnemann Library, Queen Lane Library and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, systems engineering, health informatics, information systems, and technology. Resources are available online at library.drexel.edu or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/about/w-w-hagerty).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

iCommons

Located in Room 106 of the Rush Building, the College's iCommons is an open lab and collaborative work environment for students. It features

desktop computers, a wireless/laptop area, free black and white printing, more collaborative space for its students and a furnished common area. There is a fully equipped conference room for student use with a 42" display and videoconferencing capabilities. The iCommons provides technical support to students, faculty, and administrative staff. In addition, the staff provides audio-visual support for all presentation classrooms within the Rush Building. Use of the iCommons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the iCommons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge CASE and project management software for usage in the iCommons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as "DreamSpark" which allows students free access to a wide array of Microsoft software titles and operating systems.

CCI students can access Drexel's mail server from within the iCommons. The iCommons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University's network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

Rush Building

The Rush Building houses on campus classes, CCI administrative offices (academic advising, admissions, faculty, etc.) and the iCommons computer lab (open to all CCI students). The building holds 6 classrooms equipped for audio-visual presentation. These rooms typically contain a networked PC, HD video player, ceiling mounted projectors, and other equipment for presentations and demonstrations. Four of these classrooms are fully equipped to function as laptop computing labs for networking, programming and database-related projects.

In 2013, CCI redesigned its Information Technology Laboratory, located in the Rush Building, in support of the undergraduate degree program in information technology. This lab consists of enterprise class information technology hardware that students would encounter in industry positions. The hardware includes 20 high powered workstations that are available to students and specialized networking lab simulation software. The hardware is networked and reconfigurable utilizing multiple virtual technologies as needed for the various classes the laboratory supports. In addition a special system has been built into to the classroom to allow for conversion into a standard laptop computing lab utilizing motorized monitor lifts that allow the monitors and keyboards to recess into the desk.

Cyber Learning Center

The Cyber Learning Center, located in University Crossings, provides consulting and other learning resources for students taking computer science classes. It is staffed by graduate and undergraduate computer science students in the College of Computing & Informatics.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, across Drexel's main campus including: the Auerbach and Berger Families Cybersecurity Laboratory, Drexel Health and Risk Communication Lab, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), Geometric and Intelligent

Computing Laboratory (GICL), High Performance Computing Laboratory (SPIRAL), Privacy, Security and Automation Laboratory (PSAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College's research web page.

Alumni Garden

The Rush Building's Alumni Garden provides additional collaborative space for students, faculty, professional staff and alumni. The Garden features wireless networking, tables with built-in power outlets, accessible covered patio and balconies and a bicycle rack. The Alumni Garden (http://cci.drexel.edu/about/our-facilities/rush-building/rush-alumni-garden-request-for-use.aspx) may be reserved for Drexel events.

University Crossings

CCI also has on campus classrooms, administrative offices and faculty offices at University Crossings 100, located at the corner of JFK and Market Streets. The building houses a student computer lab (featuring workstations and laptop plug-in stations, arranged in pods, to encourage collaboration among CCI students), as well as several classrooms with video-conference enabled technology and media projection capabilities. Its Cyber Learning Center provides consulting and other learning resources for students taking computer science classes within the College. University Crossings is also home to several of the College's research groups and laboratories (http://cci.drexel.edu/research/labs-and-institutes.aspx).

3401 Market Street

3401 Market Street houses faculty offices and doctoral student workspaces. It also is home to College research groups such as the Applied Informatics Group (http://cci.drexel.edu/about/our-facilities/other-cci-facilities.aspx), and University initiatives such as the Drexel University Cybersecurity Institute (http://cci.drexel.edu/cybersecurity). The Institute's newly opened Auerbach and Berger Families Cybersecurity Laboratory serves as University's first training facility dedicated to identifying challenges and discovering solutions in the areas of cyber infrastructure protection and incident response.

One Drexel Plaza

One Drexel Plaza at 30th and Market Streets houses CCI faculty offices and on campus classes via the Computing & Security Technology program.

Software Engineering Faculty

Ellen Bass, PhD (http://drexel.edu/cci/contact/Faculty/Bass-Ellen) *(Georgia Institute of Technology)* Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (http://drexel.edu/cci/contact/Faculty/Booker-Jennifer) *(Drexel University)* Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

Yuanfang Cai, PhD (http://drexel.edu/cci/contact/Faculty/Cai-Yuanfang) *(University of Virginia)* Associate Professor. Formal software design

modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD (http://drexel.edu/cci/contact/Faculty/Char-Bruce) *(University of California, Berkeley)* Professor. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed computation

Gregory W. Hislop, PhD (http://drexel.edu/cci/contact/Faculty/Hislop-Gregory) *(Drexel University)* Senior Associate Dean for Informatics and CCI Academic Affairs, Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization

Jeremy Johnson, PhD (http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy) *(Ohio State University)* Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Spiros Mancoridis, PhD (http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros) *(University of Toronto)* Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

William Regli, PhD (http://drexel.edu/cci/contact/Faculty/Regli-William) *(University of Maryland at College Park)* Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Kurt Schmidt, MS (http://drexel.edu/cci/contact/Faculty/Schmidt-Kurt) *(Drexel University)* Associate Teaching Professor. Data structures, math foundation for computer science, programming tools, programming languages

Brian Stuart, PhD (http://drexel.edu/cci/contact/Faculty/Stuart-Brian) *(Purdue University)* Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD (http://drexel.edu/cci/contact/Faculty/Vokolos-Filippos) *(Polytechnic University)* Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Rosina Weber, PhD (http://drexel.edu/cci/contact/Faculty/Weber-Rosina) *(Federal University of Santa Catarina)* Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Christopher C. Yang, PhD (http://drexel.edu/cci/contact/Faculty/Yang-Christopher) *(University of Arizona, Tucson)* Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Youth Services Specialist Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 25.9999
Standard Occupational Classification (SOC) Code: 25-4021

This certificate is designed for professionals already holding a master's degree from an ALA-accredited program or a graduate degree closely related to this specialization. This program meets the interests of students planning public library careers with a focus on youth populations

The program must be completed within five years.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics' website (http://drexel.edu/cci/programs/professional-development-programs/post-masters-specialist-program).

Required Courses

INFO 650	Public Library Service	3.0
INFO 683	Resources for Children	3.0
INFO 684	Resources for Young Adults	3.0
Select two of the following:		6.0
INFO 649	Library Programming	
INFO 552	Introduction to Web Design for Information Organizations	
INFO 665	Collection Management	
INFO 688	Instructional Role for the Information Specialist	
Total Credits		**15.0**

College of Medicine: School of Biomedical Sciences and Professional Studies

Overview

Renowned for its innovative, student-centered educational programs, the Graduate School of Biomedical Sciences and Professional Studies in the College of Medicine at Drexel University provides regionally unique PhD and Master's level academic offerings that attract the brightest, most ambitious and entrepreneurial applicants. With a strong emphasis on job placement in different scientific and health related career fields as well as academic rigor to prepare students for medical and health-related professional schools, Drexel students are at the forefront of their selected disciplines and emerge as graduates as the next generation of leaders.

Today, there are more than 950 students pursuing doctoral or master's degrees within the Graduate School in the College of Medicine.

The collaborative nature of the new Graduate School with other Drexel schools (Engineering and College of Arts and Sciences, among others) provides students with a multidisciplinary advantage. Coupled with the solid foundation afforded by a Drexel education, innovation-driven programming offers students a unique experience to launch their careers in the chosen field of study.

The Graduate School of Biomedical Sciences and Professional Studies is committed to supporting and promoting an academic "success-network" that propels the transition from training in different disciplines to becoming leaders in solving global problems.

More information is available on the Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School) website.

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- Biochemistry (MS, PhD) (p. 55)
- Biological Science (MS) (p. 79)
- Biomedicine and Business (MS) (p. 57)
- Biomedicine and Digital Media (MS) (p. 60)
- Biomedicine and Entrepreneurship (MS) (p. 64)
- Biomedicine and Law (MS) (p. 67)
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- Microbiology and Immunology (MS, PhD) (p. 96)
- Molecular Cell Biology and Genetics (MS, PhD) (p. 100)
- Molecular Medicine (MS) (p. 97)
- Molecular Pathobiology (MS, PhD) (p. 98)
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Certificates

- Clinical Research (p. 72)
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- Quantitative Principles for Clinical Research (p. 71)
- Veterinary Medical Science (p. 71)

Mission Statement

Drexel University College of Medicine excels and innovates in education, research, and delivery of compassionate care in our culture of diversity, spirited inquiry, collaboration, and opportunity.

About the College

The College of Medicine's main campus, Queen Lane, is in a suburban-like setting in the East Falls section of Philadelphia. Additional facilities are located at the Center City campus, next to Hahnemann University Hospital. Our Pediatrics Department is at St. Christopher's Hospital for Children, and the Psychiatry Department is based at Friends Hospital. Students can receive clinical education at more than 20 affiliated hospitals and ambulatory sites chosen for their commitment to teaching as well as medical excellence. The College of Medicine is renowned for its innovative educational programs, enhanced by the use of technology that permeates all components of the curriculum.

The College's medical practice, Drexel Medicine®, is a patient-focused practice emphasizing quality, innovation and community service, and enhanced by physician involvement in the research and educational programs.

Collaborative projects leveraging Drexel University's technological expertise continue to push the frontiers of nanomedicine and neuroengineering. The College of Medicine is a major regional center for spinal cord research, and has developed one of the leading centers for malaria study in the nation. Additionally, the College is home to a memory disorders center dedicated to ground-breaking research in Alzheimer's and related dementias.

Drexel University College of Medicine houses one of eight National Institute on Drug Abuse (NIDA) Centers of Excellence for Physician Information, one of 21 National Centers of Excellence in Women's Health designated by the Department of Health & Human Services, the Executive Leadership in Academic Medicine (ELAM) program, and the Archives and Special Collections on Women in Medicine. It has developed the largest HIV/AIDS primary care practice in the Mid-Atlantic region, with extensive

NIH-funded research in prevention and therapeutic intervention. Faculty clinicians are highly respected in numerous other specialties, including cardiology and pain management.

Facilities

Drexel University College of Medicine (http://www.drexel.edu/medicine) is a living laboratory, giving students a broad variety of hands-on experience, enhanced by clinical rotations in hospitals, practicums, and external research opportunities, depending on their program of study. Students in all programs benefit from the College's physical plant, which offers some of the most advanced facilities in biomedical, health sciences, and healthcare education. The Queen Lane campus is designed for the purpose of teaching basic sciences and clinical skills in lecture halls, classrooms, small group rooms and a variety of laboratories.

The College of Medicine provides wireless Internet access to curricular resources from anywhere on campus. Computers, multimedia technology, and the Internet augment the information and skills students learn from classes, print materials, and on clinical rotations. College of Medicine faculty members have been leaders in developing interactive computer-based learning tools, ranging from biochemical exercises to simulated patients presenting ethical dilemmas. Comprehensive curriculum websites, streaming videos of lectures, and online slide atlases for histology and pathology are all available.

Some of the College's key facilities and their features include:

Queen Lane Student Activities Center
A 17,700-square-foot student activity center was completed in 2006 at the Queen Lane Campus. The Student Activities Center occupies 2 floors and houses a full line of exercise equipment, a bookstore, student government offices and flexible space for events and lectures. The facility is available to students, staff and groups.

Queen Lane Medical Simulation Center
The College opened a state-of-the-art simulation center for medical education in 2010. Part of a new 25,000-square-foot addition, the center allows students to learn in simulated operating room and patient room settings.

Clinical Education Assessment Center
Ten examination rooms with digital capture that simulate physicians' offices are linked to control and observation rooms for faculty. Students work with standardized patients to enhance their abilities in medical interviewing, physical examination skills, and patient counseling.

Multidisciplinary Laboratories

- Forty-two tables with microscopes for teaching neuroanatomy, microbiology, and pathology are available.
- Microscopes are equipped with a networked video system so that all students in a class can look at a single slide under the microscope through monitors on their lab tables or on a projection screen and can retrieve microscopic images via computer.

New College Building
The New College Building at the Center City Hahnemann campus is designed for the purpose of teaching basic and clinical sciences, with auditoriums, classrooms, laboratories and offices. The lecture halls are designed to accommodate a variety of educational methodologies, spanning from the basic lecture format to the enriched laboratory setting

where courses such as Anatomy, Pathology, Microbiology, Histology and Applied Anatomic Pathology can be taught.

Libraries
Drexel University has four libraries (http://www.drexel.edu/medicine/About/Libraries) to serve the needs of students, faculty and staff. The collections of two libraries – one at Queen Lane and one at Center City – emphasize subjects relevant to the health sciences, with print resources distributed to meet the needs of the programs and departments at each campus, and free document delivery service between the locations.

Computers in the reference areas of each library, and the Microcomputer Centers, provide access to the Libraries' online catalog; to databases (indexes) including MEDLINE, CINAHL, and PsycINFO; to more than 2000 full-text electronic journals, and to online reference resources such as MD Consult and Harrison's Online. Full Internet access is provided for reference and research purposes.
All online resources (databases, electronic journals, etc.) are available to students, staff and faculty who are registered Library users, and can be accessed from off-campus locations. In addition to Internet access, computers in the Microcomputer Centers also provide a broad range of software including word processing, spreadsheet, communications, graphics, and statistics. Computer-assisted instruction and tutorials are available for many curricula-related topics. A plotter and scanner are also available at some locations.

The Library staff is dedicated to providing assistance to students and other library users through on-the-spot reference help, mediated literature searches, and instructional sessions. Guides are available online to help with the use of Library services and resources.

Videoconferencing
Drexel University College of Medicine makes extensive use of videoconferencing between Philadelphia campuses and clinical teaching sites, and the Sacramento campus. There are videoconferencing classrooms with split screen to allow for speakers in different locations.

Web-Based Instruction
Uses of web-based instruction range from providing a supplement to classroom instruction to teaching a whole course remotely. Many instructors post their syllabi on the web, distribute supplementary readings via the web, and set up electronic discussion lists for their students. Having students submit assignments electronically is common practice.

Unique faculty-developed tools, including doc.com, a web-based set of video encounters between physician and patient, help medical students improve their communication skills. DxR, a web-based patient simulation program, trains students in clinical reasoning; and MedEthEx provides an online series of exercises in medical ethics and communication. The recently implemented Web-OSCE, closely linked to doc.com, allows medical trainees to interview standardized patients remotely and receive performance feedback.

Biochemistry

Major: Biochemistry
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 36.0 - 48.0 (MS) or 96.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0202
Standard Occupational Classification (SOC) code: 19-1021

About the Program

The graduate program in biochemistry offers a challenging and broad-based graduate program of research and coursework leading to the MS or PhD degree. The aim of the graduate program is to train scientists to identify, address, and solve biomedical problems at the molecular level. The themes of molecular structure, molecular mechanisms, and molecular regulation are recurrent throughout the diverse research areas represented by the biochemistry faculty.

MS in Biochemistry

A minimum of two years of full-time study is required for an MS degree. Master's graduates typically look forward to careers in clinical biochemistry, in pharmaceuticals and medical research equipment sales, or as research technicians in university and industrial laboratories.

PhD in Biochemistry

The average duration of study for a PhD degree is 5-6 years. Graduates are well-rounded, independent scientists qualified to pursue careers in research in universities, the pharmaceutical and biotech industries, and government. In addition, PhD scientists may choose to focus on college teaching, research administration, science policy, or patent law.

About the Curriculum

Background courses in biochemistry, molecular and cell biology, and integrative biology are taken during the first academic year. In addition, every student carries out short research projects in three different laboratories chosen by the student. This exposure to research not only gives the student broad research training, but also helps the student to select a thesis advisor at the end of the first academic year. In the second year, the student begins thesis research and takes several advanced courses, tailored to the student's individual interests. All students participate in student seminars and are encouraged to attend seminars in the department and University.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information about this program, including scheduling a plan of study, visit the College of Medicine's Biomedical Graduate Studies (http://www.drexel.edu/medicine/Academics/Graduate-School) website.

MS Degree Requirements Non-Thesis Option

MS without Thesis: 36.0 semester credits

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MCBG 507S	MACROMOLECULAR STRUCT & FUNCTI	2.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0
Suggested Electives [*]		
Select one of the following:		2.0-4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	
BIOC 504S	Biochemistry 3rd Lab Rotation	
BIOC 510S	Cancer Biology	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
NEUR 609S	Graduate Neuroscience II	
MIIM 630S	Advanced Molecular Biology	
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
Total Credits		**40.0-42.0**

[*]   Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

MS Degree Requirements Thesis Option

MS with thesis: 48.0 semester credits

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 600S	Biochemistry Thesis Research	9.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 507S	MACROMOLECULAR STRUCT & FUNCTI	2.0
Suggested Electives [*]		
Select one of the following:		2.0-4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	
BIOC 504S	Biochemistry 3rd Lab Rotation	
BIOC 510S	Cancer Biology	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	

MIIM 630S	Advanced Molecular Biology	
NEUR 609S	Graduate Neuroscience II	
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
Total Credits		**50.0-52.0**

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

PhD Requirements

The program requires the completion *96.0 semester credits.* During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0
BIOC 600S	Biochemistry Thesis Research	9.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 507S	MACROMOLECULAR STRUCT & FUNCTI	2.0

Suggested Electives *

Students are required to take a minimum of one of the courses from the following list: 2.0-4.0

BIOC 510S	Cancer Biology	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 630S	Advanced Molecular Biology	
NEUR 609S	Graduate Neuroscience II	
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) program.

Biomedicine and Business

Major: Biomedicine and Business
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 52.0201
Standard Occupational Classification (SOC) code: 11-1021; 13-1111; 19-1020; 19-1042; 25-1042

About the Program

Mission Statement

The MS in Biomedicine and Business degree program provides comprehensive training in fundamental aspects of scientific discovery, technology commercialization and business. This degree will enhance the academic credentials of individuals already positioned in biotechnology, biomedical or related industries that are seeking advancement in their careers. It may also serve as an entrée degree for individuals who aspire management and leadership careers within the biotechnology, life sciences and/or biomedical sciences industries.

Graduates of this program will be prepared to continue in more advanced graduate studies in science or business and/or careers in scientifically oriented management jobs in the public or private sector (e.g., biotechnology and pharmaceutical industry, academics, government, non-profit organizations).

Curriculum

This 2-year non-thesis program consists of required and elective courses in science and business (at least 30.0 semester credits) and an experiential learning component (2.0 - 6.0 semester credits). The program's "flex-credit" option allows students to customize their plan of study depending on each individual's academic and professional aspirations.

"Flex-credit" can be used to select from a list of advanced elective courses. Students will choose electives based on their career interests and the option they choose to fulfill their experiential learning component. There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree. The student must complete a minimum total of 36.0 semester credits to graduate.

Traditional (Face-to-Face), Hybrid and Online Learning Options

Select courses in this program are offered in a traditional (face-to-face), hybrid and/or online formats. This allows students maximum scheduling flexibility that fits with each individual's schedules and learning styles. Students can also maintain the education continuum by mixing and

matching traditional and online courses as best works for each student. The first year courses are foundation courses in science and business.

Interdisciplinary Features

Faculty from Drexel University College of Medicine's Department of Microbiology and Immunology (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/BasicScienceDepts/MicrobiologyandImmunology.aspx), Institute for Molecular Medicine and Infectious Disease (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/Institutes/MolecularMedicineandInfectiousDisease.aspx) teach the science courses in this program. These courses are taught in semester terms (fall and spring) and are available in a traditional (face-to-face), hybrid, and/or online formats. Some of the traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Faculty from Drexel University's LeBow College of Business (http://www.lebow.drexel.edu) teach the business courses. These courses are taught face-to-face in quarter terms (fall, winter, spring and summer) at the University City Campus (Building No. 61 in the University City Campus map (http://drexel.edu/about/directions/university-city-map)). The University City campus is a 10-minute walk from Center City, the core of Philadelphia's (http://www.drexel.edu/about/philadelphia) commercial and business district. Shuttle service is available between campuses.

Semesters and quarters at Drexel overlap (view calendar (http://www.drexelmed.edu/drexel-pdf/program-biomedicine-4/Drexel_Biomedicine_Semester_Quarter_Calendar_Overlap_2.pdf) [PDF]) sufficiently to allow students to meet the degree requirements for this program in 2 years. Three credit (3.0) quarter courses confer the equivalent of 2.0 semester credits. Students must enroll in at least one science course each semester.

Full-time and Part-Time Options

Students may meet the degree requirements in either a full-time (at least 9.0 credits per semester) or part-time basis. At least 4.5 semester credits are required to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (http://www.drexel.edu/drexelcentral).

Program Contact Information

For questions about the curriculum and program goals, please contact:

> Sandra Urdaneta-Hartmann, MD, PhD, MBA
> Program Director
> Email: slu22@drexel.edu

For questions about how to apply to the program, please contact:

> Stephanie Schleidt
> Academic Administrator
> Graduate School of Biomedical Sciences and Professional Studies
> 245 North 15th Street, Mail Stop 344sds
> Philadelphia, PA 1910
> Email: stephanie.schleidt@drexelmed.edu

Additional information can be found in the College of Medicine's website (http://www.drexelmed.edu/Home/AcademicPrograms/GraduateSchoolofBiomedSciencesProfStudies/BiomedicineandBusiness.aspx).

Admission Requirements

For acceptance into the MS in Biomedicine and Business program, post-college applicants must have completed a four-year degree program in business, biology, chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA.

Applicants must also fulfill the following requirements for consideration as defined by the Program Advisory Committee and the Graduate Program Committee (Curriculum & Evaluation Subcommittee) within the Graduate School of Biomedical Sciences and Professional Studies at the College of Medicine:

- Official transcripts from all colleges and universities attended;
- Official test scores from graduate and professional admission exams are highly desirable, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT); and
- References from at least three instructors or professionals.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

Online applications (https://banner.drexel.edu/pls/duprod/bwskalog.P_disploginnon) are accepted all year round, but all admitted students initiate their studies in the following fall semester. Students are encouraged to apply no later than July 1 for consideration for admission the following fall semester. Students may defer admission by one year.

Program Contact Information

For questions about how to apply to the program, please contact:

> Stephanie Schleidt
> Academic Administrator
> Graduate School of Biomedical Sciences and Professional Studies
> 245 North 15th Street, Mail Stop 344sds
> Philadelphia, PA 1910
> Email: stephanie.schleidt@drexelmed.edu

Degree Requirements

Courses with the MIIM or IDPT designation are offered by Drexel University College of Medicine and are taught in semester terms (fall and spring). These courses are available in a traditional (face-to-face), hybrid, and/or online formats. Some of these traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Courses offered by LeBow College of Business are designated as BUSN. They are taught face-to-face in quarter terms (fall, winter, spring and summer) at the University City Campus (Building No. 61 in the University City Campus map (http://drexel.edu/about/directions/university-city-map)). The University City campus is a 10-minute walk from Center City, the core

of Philadelphia's (http://www.drexel.edu/about/philadelphia) commercial and business district. Shuttle service is available between campuses.

There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree.

Please note that the credits for the BUSN courses shown below are shown in quarter credits. Three (3.0) credit quarter courses confer the equivalent of 2.0 semester credits. The program required the completion of 36.0 semester credits for graduation. Semesters and quarters overlap sufficiently to allow full-time students to meet the degree requirements for this program in two years.

Required Courses

Science Requirements		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 550S	Biomedicine Seminar	2.0
MIIM 605S	Experiential Learning	4.0
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
Business Requirements		
BUSN 501	Measuring and Maximizing Financial Performance [*]	3.0
BUSN 502	Essentials of Economics [*]	3.0
MGMT 601	Managing the Total Enterprise [*]	3.0
Electives		
Select a minimum of 8 credits from the following electives:		8.0
MIIM 521S	Biotechniques I	
MIIM 530S	Fundamentals of Molecular Medicine I	
MIIM 531S	Fundamentals of Molecular Medicine II	
MIIM 533S	Fundamentals in Molecular Medicine V	
MIIM 534S	Fund. Molecular Med. VI	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 545S	Introduction to Infectious Diseases	
MIIM 546S	Introduction to Immunology	
MIIM 606S	Micro & Immuno Seminar	
MIIM 613S	Emerging Infectious Diseases	
MIIM 653S	Clinical Correlations in Infectious Disease	
ORGB 625	Leadership and Professional Development [*]	
ORGB 631	Leading Effective Organizations [*]	
Total Credits		**39.0**

[*] Science courses are offered on a semester basis, and business courses are offered on a quarter basis. Semesters and quarters overlap sufficiently to allow students to meet the degree requirements in 2 years. The formula to convert quarter credit hours to semester credit hours is: Number of quarter credit hours x 0.6667 = Number of semester credit hours. Therefore a 3.0 quarter credit course will convert to 2.0 semester credits. This program requires a minimum of 36.0 semester credits to meet the degree requirements.

Sample Plan of Study

Below is a sample full-time plan of study that can be completed in two years. Students may also opt to enroll part-time. Part-time students must complete the program within four years. To learn more about part-time options, please contact the Program Director, Sandra Urdaneta-Hartmann, MD, PhD, MBA at slu@drexel.edu for more information.

First Year

Fall		Credits
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 550S	Biomedicine Seminar	2.0
IDPT 500S	Responsible Conduct of Research	2.0
BUSN 501[*]	Measuring and Maximizing Financial Performance	3.0
	Term Credits	**10.0**

Total Credit: 10.0

[*] Business requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for first year, fall semester = 9.0

First Year

Spring		Credits
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
IDPT 501S	Biostatistics I	2.0
BUSN 502[*]	Essentials of Economics	3.0
MGMT 601[*]	Managing the Total Enterprise	3.0
	Term Credits	**11.0**

Total Credit: 11.0

[*] Business requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for first year, spring semester = 9.0

Second Year

Fall		Credits
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 605S	Experiential Learning	4.0
ORGB 625[*]	Leadership and Professional Development	3.0
MIIM 540S[**]	Viruses and Viral Infections (or other elective)	2.0
	Term Credits	**10.0**

Total Credit: 10.0

*   Business requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for second year, spring semester = 9.0

**   Other electives are as follows: MIIM 521S, MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 546S, MIIM 606S, MIIM 613S, MIIM 653S, ORGB 625, ORGB 631

Second Year

Spring		Credits
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
ORGB 631[*]	Leading Effective Organizations	3.0
MIIM 521S[**]	Biotechniques I (or other elective)	2.0
	Term Credits	**10.0**

Total Credit: 10.0

*   Business requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for second year, spring semester = 9.0

**   Other electives are as follows: MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 540S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 546S, MIIM 606S, MIIM 613S, MIIM 653S, ORGB 625, ORGB 631

Program Goals

Upon completion of the degree requirements of this program students would have achieved the following program-level goals:

1. **Develop broad core knowledge in biological sciences, business and biomedical technology development**
   - Be proficient in fundamental concepts in molecular and cellular biology, and other major areas within the biological sciences
   - Be proficient in fundamental concepts in finance, economics, management and organizational leadership
   - Be proficient in the process of biomedical innovation development and commercialization

2. **Develop analytical and critical thinking skills**
   - Be able to critically analyze the ideas and concepts related to science and business presented written or orally by others (e.g., textbooks, journals, mass media, peers and subject matter experts)
   - Be able to identify, analyze, and evaluate the need for innovative solutions to problems or challenges in biomedicine and business
   - Be able to identify and analyze scientific and business-related challenges faced in biomedical product development
   - Be able to identify, analyze, and evaluate the need for innovative solutions to problems or challenges in biomedicine and business
   - Be able to draft and analyze strategic and tactical plans to deliver a biomedical product to the market
   - Be able to articulate and defend their analysis

3. **Develop research skills**
   - Be proficient at conducting primary research
   - Be proficient in collecting data from electronic databases, the World Wide Web, the library, and other sources
   - Be able to interpret data

4. **Develop professional ethics**
   - Be able to identify and evaluate professional ethical dilemmas, and discuss appropriate resolutions
   - Apply professional ethical standards such as appropriate attribution of ideas, good recordkeeping, and truthful presentation of data/facts and conclusions
   - Be able identify and evaluate the economic and social impact of strategic decisions

5. **Develop communication and leadership skills**
   - Be proficient at developing oral and/or written comprehensive reports, presenting facts, analysis, and conclusions
   - Be proficient at using appropriate technologies for communication
   - Be able to interact and work effectively with others in work settings involving cultural and demographic diversity

6. **Develop other "work readiness" soft skills (e.g., teamwork, problem-solving, knowledge of career opportunities, networking)**
   - Be knowledgeable of career opportunities in their desired field
   - Be proficient at presenting a professional profile of oneself
   - Be proficient at time-management
   - Be able to work in teams
   - Begin to develop problem-solving skills for use in the workplace
   - Begin to develop a professional network

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of Drexel's Student Learning Priorities (DSLPs) (http://www.drexel.edu/provost/irae/assessment/outcomes/dslp) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship and creative expression
- Responsible citizenship

Biomedicine and Digital Media

Major: Biomedicine and Business
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26; 50.0401;51.2703

Standard Occupational Classification (SOC) code: 19-1020; 19-1042; 25-1042; 27-1014

About the Program

The MS in Biomedicine and Digital Media program is a graduate degree program that intersects science, technology, art and entrepreneurship. This skills-based program is for individuals interested in media design and production careers with an emphasis in health and science.

Graduates of this program will be prepared to progress into more advanced graduate studies in science or digital media and/or careers in scientifically oriented media/communication jobs in the public or private sector (e.g., academic, scientific publishing and media companies), or lead their new ventures in digital imaging.

Curriculum

This 2-year non-thesis program consists of required and elective courses in science and digital media (at least 30.0 semester credits) and an experiential learning component (2.0-6.0 semester credits). The program's "flex-credit" option allows students to customize their plan of study depending on each individual's academic and professional aspirations.

"Flex-credit" can be used to select from a list of advanced elective courses. Students will choose electives based on their career interests and the option they choose to fulfill their experiential learning component. There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree. The student must complete a minimum total of 36.0 semester credits to graduate.

Traditional (Face-to-Face), Hybrid and Online Learning Options

Select courses in this program are offered in a traditional (face-to-face), hybrid and/or online formats. This allows students maximum scheduling flexibility that fits with each individual's schedules and learning styles. Students can also maintain the education continuum by mixing and matching traditional and online courses as best works for each student. The first year courses are foundation courses in science and business.

Interdisciplinary Features

Faculty from Drexel University College of Medicine's Department of Microbiology and Immunology (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/BasicScienceDepts/MicrobiologyandImmunology.aspx), Institute for Molecular Medicine and Infectious Disease (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/Institutes/MolecularMedicineandInfectiousDisease.aspx) teach the science courses in this program. These courses are taught in semester terms (fall and spring) and are available in a traditional (face-to-face), hybrid, and/or online formats. Some of the traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Faculty from theDepartment of Digital Media at Drexel University's Westphal College of Media Arts and Design (http://replay.drexel.edu) teach the digital media courses. These courses are taught face-to-face in quarter terms (fall, winter, spring and summer) at the University City Campus (Building No. 71 in the University City Campus map (http://

drexel.edu/about/directions/university-city-map)). The University City campus is a 10-minute walk from Center City, the core of Philadelphia's (http://www.drexel.edu/about/philadelphia) commercial and business district. Shuttle service is available between campuses.

Semesters and quarters at Drexel overlap (view calendar (http://www.drexelmed.edu/drexel-pdf/program-biomedicine-4/Drexel_Biomedicine_Semester_Quarter_Calendar_Overlap_2.pdf) [PDF]) sufficiently to allow students to meet the degree requirements for this program in 2 years. Three credit (3.0) quarter courses confer the equivalent of 2.0 semester credits. Students must enroll in at least one science course each semester.

Full-time and Part-Time Options

Students may meet the degree requirements in either a full-time (at least 9.0 credits per semester) or part-time basis. At least 4.5 semester credits are required to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (http://www.drexel.edu/drexelcentral).

Program Contact Information

For questions about the curriculum and program goals, please contact:

Sandra Urdaneta-Hartmann, MD, PhD, MBA
Program Director
Email: slu22@drexel.edu

For questions about how to apply to the program, please contact:

Stephanie Schleidt
Academic Administrator
Graduate School of Biomedical Sciences and Professional Studies
245 North 15th Street, Mail Stop 344sds
Philadelphia, PA 1910
Email: stephanie.schleidt@drexelmed.edu

Additional information can be found of the College of Medicine's website (http://www.drexelmed.edu/Home/AcademicPrograms/GraduateSchoolofBiomedSciencesProfStudies/BiomedicineandDigitalMedia.aspx).

Admission Requirements

For acceptance into the MS in Biomedicine and Digital Media program, post-college applicants must have completed a four-year degree program in business, biology, chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA.

Applicants must also fulfill the following requirements for consideration as defined by the Program Advisory Committee and the Graduate Program Committee (Curriculum & Evaluation Subcommittee) within the Graduate School of Biomedical Sciences and Professional Studies at the College of Medicine:

- Official transcripts from all colleges and universities attended;
- Official test scores from graduate and professional admission exams are highly desirable, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT); and

- References from at least three instructors or professionals.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

Online applications (https://banner.drexel.edu/pls/duprod/bwskalog.P_disploginnon) are accepted all year round, but all admitted students initiate their studies in the following fall semester. Students are encouraged to apply no later than July 1 for consideration for admission the following fall semester. Students may defer admission by one year.

Program Contact Information

For questions about how to apply to the program, please contact:

Stephanie Schleidt
Academic Administrator
Graduate School of Biomedical Sciences and Professional Studies
245 North 15th Street, Mail Stop 344sds
Philadelphia, PA 1910
Email: stephanie.schleidt@drexelmed.edu

Degree Requirements

Courses with the MIIM or IDPT designation are offered by Drexel University College of Medicine and are taught in semester terms (fall and spring). These courses are available in a traditional (face-to-face), hybrid, and/or online formats. Some of these traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Courses offered by Westphal College of Media Arts and Design are designated as DIGM. They are taught face-to-face in quarter terms (fall, winter, spring and summer) at the University City Campus (Building No. 71 in the University City Campus map (http://drexel.edu/about/directions/university-city-map)). The University City campus is a 10-minute walk from Center City, the core of Philadelphia's (http://www.drexel.edu/about/philadelphia) commercial and business district. Shuttle service is available between campuses.

There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree.

Please note that the credits for the DIGM courses shown below are shown in quarter credits. Three (3.0) credit quarter courses confer the equivalent of 2.0 semester credits. The program required the completion of 36.0 semester credits for graduation. Semesters and quarters overlap sufficiently to allow full-time students to meet the degree requirements for this program in two years.

Required Courses

Science Requirements		
IDPT 500S	Responsible Conduct of Research	2.0
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 550S	Biomedicine Seminar	2.0
MIIM 605S	Experiential Learning	3.0
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
Digital Media Requirements		
DIGM 505	Design and Interactivity [*]	3.0
DIGM 506	Animation and Game Design [*]	3.0
DIGM 520	Advanced Interactivity I [*]	3.0
DIGM 521	Advanced Interactivity II [*]	3.0
DIGM 525	Advanced Animation I [*]	3.0
DIGM 530	Advanced Game Design I [*]	3.0
Electives		
Students must select a minimum of 5 credits from the following:		5.0
IDPT 501S	Biostatistics I	
MIIM 521S	Biotechniques I	
MIIM 530S	Fundamentals of Molecular Medicine I	
MIIM 531S	Fundamentals of Molecular Medicine II	
MIIM 533S	Fundamentals in Molecular Medicine V	
MIIM 534S	Fund. Molecular Med. VI	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 545S	Introduction to Infectious Diseases	
MIIM 546S	Introduction to Immunology	
MIIM 606S	Micro & Immuno Seminar	
MIIM 613S	Emerging Infectious Diseases	
MIIM 653S	Clinical Correlations in Infectious Disease	
DIGM 526	Advanced Animation II	
DIGM 531	Advanced Game Design II	
Total Credits		**42.0**

[*]   Science courses are offered on a semester basis, and digital media courses are offered on a quarter basis. Semesters and quarters overlap sufficiently to allow students to meet the degree requirements in 2.5 years. The formula to convert quarter credit hours to semester credit hours is: Number of quarter credit hours x 0.6667 = Number of semester credit hours. Therefore a 3.0 quarter credit course will convert to 2.0 semester credits. This program requires a minimum of 36.0 semester credits to meet the degree requirements.

Sample Plan of Study

Below is a sample full-time plan of study that can be completed in two years. Students may also opt to enroll part-time. Part-time students must complete the program within four years. To learn more about part-time options, please contact the Program Director, Sandra Urdaneta-Hartmann, MD, PhD, MBA at slu@drexel.edu for more information.

First Year

Fall		Credits
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 550S	Biomedicine Seminar	2.0
DIGM 525[*]	Advanced Animation I	3.0
DIGM 520[*]	Advanced Interactivity I	3.0
	Term Credits	**11.0**

Total Credit: 11.0

[*] Digital Media courses are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for first year, fall semester = 9.0

First Year

Spring		Credits
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
IDPT 500S	Responsible Conduct of Research	2.0
DIGM 530[*]	Advanced Game Design I	3.0
DIGM 521[*]	Advanced Interactivity II	3.0
	Term Credits	**11.0**

Total Credit: 11.0

[*] Digital Media courses are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for first year, spring semester = 9.0

Second Year

Fall		Credits
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 605S	Experiential Learning	3.0
MIIM 540S[**]	Viruses and Viral Infections (or other elective)	2.0
MIIM 653S[**]	Clinical Correlations in Infectious Disease (or other elective)	3.0
	Term Credits	**9.0**

Total Credit: 9.0

[**] Other electives are as follows: IDPT 500S, IDPT 501S, MIIM 521S, MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 606S, MIIM 613S, DIGM 526, DIGM 531

Second Year

Spring		Credits
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
DIGM 526[*, **]	Advanced Animation II (or other elective)	3.0
DIGM 531[*, **]	Advanced Game Design II (or other elective)	3.0
	Term Credits	**11.0**

Total Credit: 11.0

[*] Digital Media courses are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for second year, spring semester = 9.0

[**] Other electives are as follows: IDPT 500S, IDPT 501S, MIIM 521S, MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 540S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 606S, MIIM 613S, MIIM 653S

Program Goals

Upon completion of the degree requirements of this program students would have achieved the following program-level goals:

1. **Develop broad core knowledge in digital media development for biomedical science applications**
   - Be proficient in fundamental concepts in molecular and cellular biology, and other major areas within the biological sciences
   - Be proficient in animation and game design
   - Be proficient in the process of biomedical innovation development and commercialization

2. **Develop analytical and critical thinking skills**
   - Be able to critically analyze the ideas and concepts related to science and digital media presented written or orally by others (e.g., textbooks, journals, mass media, presentations by peers and subject matter experts)
   - Be able to identify, analyze, and evaluate the need for innovative solutions to problems or challenges in biomedicine and innovation management
   - Be able to identify and analyze challenges faced in biomedical innovation development and management, including in the field of digital media
   - Be able to discuss the commercial viability of innovative biomedical products
   - Be able to draft and analyze strategic and tactical plans to deliver a biomedical product to the market
   - Be able to articulate and defend their analysis

3. **Develop research skills**
   - Be proficient at conducting primary research
   - Be proficient in collecting data from electronic databases, the World Wide Web, the library, and other sources
   - Be able to interpret data

4. **Develop professional ethics**
   - Be able to identify and evaluate professional ethical dilemmas, and discuss appropriate resolutions
   - Apply professional ethical standards such as appropriate attribution of ideas, good recordkeeping, and truthful presentation of data/facts and conclusions
   - Be able identify and evaluate the economic and social impact of strategic decisions

5. **Develop communication and leadership skills**
   - Be proficient at developing oral and/or written comprehensive reports, presenting facts, analysis, and conclusions
   - Be proficient at using appropriate technologies for communication
   - Be able to interact and work effectively with others in work settings involving cultural and demographic diversity

6. **Develop other "work readiness" soft skills (e.g., teamwork, problem-solving, knowledge of career opportunities, networking)**

- Be knowledgeable of career opportunities in their desired field
- Be proficient at presenting a professional profile of oneself
- Be proficient at time-management
- Be able to work in teams
- Begin to develop problem-solving skills for use in the workplace
- Begin to develop a professional network

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of (https://www.drexel.edu/provost/learningpriorities) Drexel's Student Learning Priorities (DSLPs) (http://www.drexel.edu/provost/irae/assessment/outcomes/dslp) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship and creative expression
- Responsible citizenship

Biomedicine and Entrepreneurship

Major: Biomedicine and Entrepreneurship
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26; 52.0701
Standard Occupational Classification (SOC) code: 19-1020; 19-1042; 11-1011

About the Program

Mission Statement

The MS in Biomedicine and Entrepreneurship program integrates training in technical and practical aspects of science, research and entrepreneurship for individuals interested in pursuing innovation-driven careers in the life sciences. The program helps develop individual initiative and entrepreneurial thinking around scientific discoveries and innovation. The program is designed to facilitate not only new venture creation but also individual initiative and entrepreneurial thinking.

Graduates of the program will be prepared to progress into more advanced graduate studies in science or entrepreneurship and/or careers in scientifically oriented management jobs in the public or private sector. These graduates will especially be equipped to lead or have top management roles in new biomedical or life sciences ventures.

Curriculum

This 2-year non-thesis program consists of required and elective courses in science and business (at least 30.0 semester credits) and an experiential learning component (2.0 - 6.0 semester credits). The program's "flex-credit" option allows students to customize their plan of study depending on each individual's academic and professional aspirations.

"Flex-credit" can be used to select from a list of advanced elective courses. Students will choose electives based on their career interests and the option they choose to fulfill their experiential learning component. There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree. The student must complete a minimum total of 36.0 semester credits to graduate.

Traditional (Face-to-Face), Hybrid and Online Learning Options

Most courses in this program are offered as online only. Select courses in this program are offered in a traditional (face-to-face), hybrid and/or online formats. This allows students maximum scheduling flexibility that fits with each individual's schedules and learning styles. Students can also maintain the education continuum by mixing and matching traditional and online courses as best works for each student. The first year courses are foundation courses in science and business.

Interdisciplinary Features

Faculty from Drexel University College of Medicine's Department of Microbiology and Immunology (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/BasicScienceDepts/MicrobiologyandImmunology.aspx), Institute for Molecular Medicine and Infectious Disease (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/Institutes/MolecularMedicineandInfectiousDisease.aspx) teach the science courses in this program. These courses are taught in semester terms (fall and spring) and are available in a traditional (face-to-face), hybrid, and/or online formats. Some of the traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Faculty from Drexel University's Drexel University's Close School of Entrepreneurship (http://www.drexel.edu/close), teach the entrepreneurship courses. These courses are taught online in quarter terms (fall, winter, spring and summer). The Close School is located in the University City Campus (Building No. 61 in the University City Campus map (http://drexel.edu/about/directions/university-city-map)). The University City campus is a 10-minute walk from Center City, the core of Philadelphia's (http://www.drexel.edu/about/philadelphia) commercial and business district. Shuttle service is available between campuses.

Semesters and quarters at Drexel overlap (view calendar (http://www.drexelmed.edu/drexel-pdf/program-biomedicine-4/Drexel_Biomedicine_Semester_Quarter_Calendar_Overlap_2.pdf) [PDF]) sufficiently to allow students to meet the degree requirements for this program in 2 years. Three credit (3.0) quarter courses confer the equivalent of 2.0 semester credits. Students must enroll in at least one science course each semester.

Full-time and Part-Time Options

Students may meet the degree requirements in either a full-time (at least 9.0 credits per semester) or part-time basis. At least 4.5 semester credits are required to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (http://drexel.edu/drexelcentral).

Program Contact Information

For questions about the curriculum and program goals, please contact:

Sandra Urdaneta-Hartmann, MD, PhD, MBA
Program Director
Email: slu22@drexel.edu

For questions about how to apply to the program, please contact:

Stephanie Schleidt
Academic Administrator
Graduate School of Biomedical Sciences and Professional Studies
245 North 15th Street, Mail Stop 344sds
Philadelphia, PA 1910
Email: stephanie.schleidt@drexelmed.edu

Additional information can be found of the College of Medicine's website (http://www.drexelmed.edu/Home/AcademicPrograms/GraduateSchoolofBiomedSciencesProfStudies/BiomedicineandEntrepreneurship.aspx).

Admission Requirements

For acceptance into the MS in Biomedicine and Entrepreneurship program, post-college applicants must have completed a four-year degree program in business, biology, chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA.

Applicants must also fulfill the following requirements for consideration as defined by the Program Advisory Committee and the Graduate Program Committee (Curriculum & Evaluation Subcommittee) within the Graduate School of Biomedical Sciences and Professional Studies at the College of Medicine:

- Official transcripts from all colleges and universities attended;
- Official test scores from graduate and professional admission exams are highly desirable, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT); and
- References from at least three instructors or professionals.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

Online applications (https://banner.drexel.edu/pls/duprod/bwskalog.P_disploginnon) are accepted all year round, but all admitted students initiate their studies in the following fall semester. Students are encouraged to apply no later than July 1 for consideration for admission the following fall semester. Students may defer admission by one year.

Program Contact Information

For questions about how to apply to the program, please contact:

Stephanie Schleidt
Academic Administrator
Graduate School of Biomedical Sciences and Professional Studies
245 North 15th Street, Mail Stop 344sds
Philadelphia, PA 1910
Email: stephanie.schleidt@drexelmed.edu

Degree Requirements

Courses with the MIIM or IDPT designation are offered by Drexel University College of Medicine and are taught in semester terms (fall and spring). These courses are available in a traditional (face-to-face), hybrid, and/or online formats. Some of these traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Courses offered by the Close School of Entrepreneurship are designated as ENTP. They are taught mostly online in quarter terms (fall, winter, spring and summer).

There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree.

Please note that the credits for the ENTP courses shown below are shown in quarter credits. Three (3.0) credit quarter courses confer the equivalent of 2.0 semester credits. The program required the completion of 36.0 semester credits for graduation. Semesters and quarters overlap sufficiently to allow full-time students to meet the degree requirements for this program in 2 years.

Required Courses

Science Requirements		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 550S	Biomedicine Seminar	2.0
MIIM 605S	Experiential Learning	4.0
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
Entrepreneurship Requirements		
ENTP 501	Entrepreneurship Essentials [*]	3.0
ENTP 610	Leading New Ventures [*]	3.0
ENTP 640	Methods of Entrepreneurship [*]	3.0
Electives		
Select a minimum of 8 credits from the following electives:		8.0

MIIM 521S	Biotechniques I	
MIIM 530S	Fundamentals of Molecular Medicine I	
MIIM 531S	Fundamentals of Molecular Medicine II	
MIIM 533S	Fundamentals in Molecular Medicine V	
MIIM 534S	Fund. Molecular Med. VI	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 545S	Introduction to Infectious Diseases	
MIIM 546S	Introduction to Immunology	
MIIM 606S	Micro & Immuno Seminar	
MIIM 613S	Emerging Infectious Diseases	
MIIM 653S	Clinical Correlations in Infectious Disease	
ENTP 535	Social Entrepreneurship [*]	
Total Credits		**39.0**

[*]   Science courses are offered on a semester basis, and entrepreneurship courses are offered on a quarter basis. Semesters and quarters overlap sufficiently to allow students to meet the degree requirements in 2 years. The formula to convert quarter credit hours to semester credit hours is: Number of quarter credit hours x 0.6667 = Number of semester credit hours. Therefore a 3.0 quarter credit course will convert to 2.0 semester credits. This program requires a minimum of 36.0 semester credits to meet the degree requirements.

Sample Plan of Study

Below is a sample full-time plan of study that can be completed in two years. Students may also opt to enroll part-time. Part-time students must complete the program within four years. To learn more about part-time options, please contact the Program Director, Sandra Urdaneta-Hartmann, MD, PhD, MBA at slu@drexel.edu for more information.

First Year

Fall		Credits
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 550S	Biomedicine Seminar	2.0
IDPT 500S	Responsible Conduct of Research	2.0
ENTP 501 [*]	Entrepreneurship Essentials	3.0
	Term Credits	**10.0**

Total Credit: 10.0

[*]   Entrepreneurship requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for first year, fall semester = 9.0

First Year

Spring		Credits
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
IDPT 501S	Biostatistics I	2.0
ENTP 610 [*]	Leading New Ventures	3.0

MIIM 546S [**]	Introduction to Immunology (or other elective)	2.0
	Term Credits	**10.0**

Total Credit: 10.0

[*]   Entrepreneurship requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for first year, spring semester = 9.0

[**]   Other electives are as follows: MIIM 521S, MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 540S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 606S, MIIM 613S, MIIM 653S, ENTP 535

Second Year

Fall		Credits
MIIM 535S	Biomedical Technology Commercialization I	1.0
MIIM 605S	Experiential Learning	4.0
ENTP 640 [*]	Methods of Entrepreneurship	3.0
MIIM 540S [**]	Viruses and Viral Infections (or other elective)	2.0
	Term Credits	**10.0**

Total Credit: 10.0

[*]   Entrepreneurship requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for second year, fall semester = 9.0

[**]   Other electives are as follows: MIIM 521S, MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 546S, MIIM 606S, MIIM 613S, MIIM 653S, ENTP 535

Second Year

Spring		Credits
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
ENTP 535 [*]	Social Entrepreneurship	3.0
MIIM 521S [**]	Biotechniques I (or other elective)	2.0
	Term Credits	**10.0**

Total Credit: 10.0

[*]   Entrepreneurship requirements are listed in quarter credits. However, 2.0 semester credits will be awarded for 3.0 quarter credits. Total semester credits for second year, spring semester = 9.0

[**]   Other electives are as follows: MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 540S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 546S, MIIM 606S, MIIM 613S, MIIM 653S ENTP 535

Program Goals

Upon completion of the degree requirements for this MS program, students would have achieved the following program-level goals:

1. **Develop broad core knowledge in biological sciences, entrepreneurship and biomedical innovation**
   - Be proficient in fundamental concepts in molecular and cellular biology, and other major areas within the biological sciences
   - Be proficient in fundamental concepts in entrepreneurship
   - Be proficient in the process of biomedical innovation development and commercialization

2. **Develop analytical and critical thinking skills**

- Be able to critically analyze the ideas and concepts related to science and entrepreneurship presented written or orally by others (e.g., textbooks, journals, mass media, presentations by peers and subject matter experts)
- Be able to identify, analyze, and evaluate the need for innovative solutions to problems or challenges in biomedicine and innovation management
- Be able to identify and analyze challenges faced in biomedical innovation development and management
- Be able to discuss the commercial viability of innovative biomedical products (e.g., drugs, devices, diagnostics, digital media content)
- Be able to draft and analyze strategic and tactical plans to deliver a biomedical product to the market
- Be able to articulate and defend their analysis

3. **Develop research skills**
   - Be proficient at conducting primary research
   - Be proficient in collecting data from electronic databases, the World Wide Web, the library, and other sources
   - Be able to interpret data

4. **Develop professional ethics**
   - Be able to identify and evaluate professional ethical dilemmas, and discuss appropriate resolutions
   - Apply professional ethical standards such as appropriate attribution of ideas, good recordkeeping, and truthful presentation of data/facts and conclusions
   - Be able identify and evaluate the economic and social impact of strategic decisions

5. **Develop communication and leadership skills**
   - Be proficient at developing oral and/or written comprehensive reports, presenting facts, analysis, and conclusions
   - Be proficient at using appropriate technologies for communication
   - Be able to interact and work effectively with others in work settings involving cultural and demographic diversity

6. **Develop other "work readiness" soft skills (e.g., teamwork, problem-solving, knowledge of career opportunities, networking)**
   - Be knowledgeable of career opportunities in their desired field
   - Be proficient at presenting a professional profile of oneself
   - Be proficient at time-management
   - Be able to work in teams
   - Begin to develop problem-solving skills for use in the workplace
   - Begin to develop a professional network

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of (https://www.drexel.edu/provost/learningpriorities) Drexel's Student Learning Priorities (DSLPs) (http://www.drexel.edu/provost/irae/assessment/outcomes/dslp) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy

- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship and creative expression
- Responsible citizenship

Biomedicine and Law

Major: Biomedicine and Law
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26; 22.0000
Standard Occupational Classification (SOC) code: 19-1020; 19-1042; 23-2000

About the Program

The Masters of Science in Biomedicine and Law degree program provides interactive and comprehensive training in technical and practical aspects of science and research, as well as in the legal aspects related to new biomedical product development, entrepreneurship and regulatory compliance. This program is geared to individuals interested in careers focused in technology development.

Graduates of this program will be prepared to progress into more advanced graduate studies in science and/or careers in scientifically oriented management jobs in the public or private sector (e.g., technology commercialization offices, patent agencies). These individuals will also be competitive Law School applicants, if they so chose to continue their professional studies, even though credits for their legal coursework in this program will not be transferable for Law School credits.

Curriculum

This 2-year non-thesis program consists of required and elective courses in science and digital media (at least 30.0 semester credits) and an experiential learning component (2.0 - 6.0 semester credits). The program's "flex-credit" option allows students to customize their plan of study depending on each individual's academic and professional aspirations.

"Flex-credit" can be used to select from a list of advanced elective courses. Students will choose electives based on their career interests and the option they choose to fulfill their experiential learning component. There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree. The student must complete a minimum total of 36.0 semester credits to graduate.

Traditional (Face-to-Face), Hybrid and Online Learning Options

Most courses in this program are offered as online only. Select courses in this program are offered in a traditional (face-to-face), hybrid and/or online formats. This allows students maximum scheduling flexibility that

fits with each individual's schedules and learning styles. Students can also maintain the education continuum by mixing and matching traditional and online courses as best works for each student. The first year courses are foundation courses in science and business.

Interdisciplinary Features

Faculty from Drexel University College of Medicine's Department of Microbiology and Immunology (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/BasicScienceDepts/MicrobiologyandImmunology.aspx), Institute for Molecular Medicine and Infectious Disease (http://www.drexelmed.edu/Home/AboutTheCollege/DepartmentsCentersandInstitutes/Institutes/MolecularMedicineandInfectiousDisease.aspx) teach the science courses in this program. These courses are taught in semester terms (fall and spring) and are available in a traditional (face-to-face), hybrid, and/or online formats. Some of the traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Faculty from Drexel University's Drexel University's K (http://www.drexel.edu/close)line School of Law (http://drexel.edu/law), teach the law courses in semester terms as well (fall and spring). Most courses offered by the Kline School of Law are taught online, but some are offered face-to-face only at the University City Campus (Building No. 90 in the University City Campus map (http://drexel.edu/about/directions/university-city-map)). The University City campus is a 10-minute walk from Center City, the core of Philadelphia's (http://www.drexel.edu/about/philadelphia) commercial and business district. Shuttle service is available between campuses.

Full-time and Part-Time Options

Students may meet the degree requirements in either a full-time (at least 9.0 credits per semester) or part-time basis. At least 4.5 semester credits are required to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (http://drexel.edu/drexelcentral).

Program Contact Information

For questions about the curriculum and program goals, please contact:

Sandra Urdaneta-Hartmann, MD, PhD, MBA
Program Director
Email: slu22@drexel.edu

For questions about how to apply to the program, please contact:

Stephanie Schleidt
Academic Administrator
Graduate School of Biomedical Sciences and Professional Studies
245 North 15th Street, Mail Stop 344sds
Philadelphia, PA 1910
Email: stephanie.schleidt@drexelmed.edu

Additional information can be found of the College of Medicine's website (http://www.drexelmed.edu/Home/AcademicPrograms/GraduateSchoolofBiomedSciencesProfStudies/BiomedicineandLaw.aspx).

Admission Requirements

For acceptance into the MS in Biomedicine and Law program, post-college applicants must have completed a four-year degree program in business, biology, chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA.

Applicants must also fulfill the following requirements for consideration as defined by the Program Advisory Committee and the Graduate Program Committee (Curriculum & Evaluation Subcommittee) within the Graduate School of Biomedical Sciences and Professional Studies at the College of Medicine:

- Official transcripts from all colleges and universities attended;
- Official test scores from graduate and professional admission exams are highly desirable, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT); and
- References from at least three instructors or professionals.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

Online applications (https://banner.drexel.edu/pls/duprod/bwskalog.P_disploginnon) are accepted all year round, but all admitted students initiate their studies in the following fall semester. Students are encouraged to apply no later than July 1 for consideration for admission the following fall semester. Students may defer admission by one year.

Program Contact Information

For questions about how to apply to the program, please contact:

Stephanie Schleidt
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Graduate School of Biomedical Sciences and Professional Studies
245 North 15th Street, Mail Stop 344sds
Philadelphia, PA 1910
Email: stephanie.schleidt@drexelmed.edu

Degree Requirements

Courses with the MIIM or IDPT designation are offered by Drexel University College of Medicine and are taught in semester terms (fall and spring). These courses are available in a traditional (face-to-face), hybrid, and/or online formats. Some of these traditional courses and hybrid courses are offered in the evenings at either the Center City Campus or the Queen Lane Campus (http://www.drexel.edu/about/directions).

Courses offered by the Kline School of Law are designated as LSTU. They are taught mostly online in semester terms (fall and spring).

There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require

that the student enroll in elective courses to meet the semester credit requirements for degree.

Required Courses

Science Requirements		
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 550S	Biomedicine Seminar	2.0
MIIM 605S	Experiential Learning	3.0
MIIM 631S	Biomedical Innovation Development and Management	4.0
MIIM 645S	Biomedical Career Explorations	1.0
Law Requirements		
LAW 783S	Bioethics	2.0
LSTU 500S	Introduction to the Legal System	2.0
LSTU 503S	Legal Research and Analysis	3.0
LSTU 506S	Patients and Privacy: HIPAA and Related Regulations	2.0

Electives

Select a minimum of 4 credits from the following Science electives:		4.0
MIIM 521S	Biotechniques I	
MIIM 530S	Fundamentals of Molecular Medicine I	
MIIM 531S	Fundamentals of Molecular Medicine II	
MIIM 533S	Fundamentals in Molecular Medicine V	
MIIM 534S	Fund. Molecular Med. VI	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 545S	Introduction to Infectious Diseases	
MIIM 546S	Introduction to Immunology	
MIIM 606S	Micro & Immuno Seminar	
MIIM 613S	Emerging Infectious Diseases	
MIIM 653S	Clinical Correlations in Infectious Disease	
Select a minimum of 6 credits from the following Law electives:		6.0
LAW 674S	Health Care Fraud and Abuse	
LAW 703S	Law and Entrepreneurship	
LAW 792S	Food and Drug Law	
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting	
LSTU 504S	Health Care Rules and Regulations	
LSTU 505S	Health Care Quality, Patient Safety and Risk Management	
LSTU 507S	Risk Assessment and Management	
Total Credits		**36.0**

Sample Plan of Study

Below is a sample full-time plan of study that can be completed in two years. Students may also opt to enroll part-time. Part-time students must complete the program within four years. To learn more about part-time options, please contact the Program Director, Sandra Urdaneta-Hartmann, MD, PhD, MBA at slu@drexel.edu for more information.

First Year		
Fall		**Credits**
MIIM 515S	Concepts in Biomedicine I	3.0
MIIM 550S	Biomedicine Seminar	2.0
LAW 783S	Bioethics	2.0
LSTU 500S	Introduction to the Legal System	2.0
	Term Credits	**9.0**

Total Credit: 9.0

First Year		
Spring		**Credits**
MIIM 516S	Concepts in Biomedicine II	2.0
MIIM 535S	Biomedical Technology Commercialization I	1.0
MIIM 645S	Biomedical Career Explorations	1.0
LSTU 503S	Legal Research and Analysis	3.0
LSTU 506S	Patients and Privacy: HIPAA and Related Regulations	2.0
	Term Credits	**9.0**

Total Credit: 9.0

Second Year		
Fall		**Credits**
MIIM 536S	Biomedical Technology Commercialization II	1.0
MIIM 605S	Experiential Learning	3.0
LSTU 501S[*]	Compliance Skills: Auditing, Investigation Reporting (or other law elective)	3.0
MIIM 540S[**]	Viruses and Viral Infections (or other science elective)	2.0
	Term Credits	**9.0**

Total Credit: 9.0

[*] Other law electives are as follows: LAW 674S, LAW 703S, LAW 792S, LSTU 504S, LSTU 505S, LSTU 507S

[**] Other science electives are as follows: MIIM 521S, MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 546S, MIIM 606S, MIIM 613S, MIIM 653S

Second Year		
Spring		**Credits**
MIIM 631S	Biomedical Innovation Development and Management	4.0
LAW 792S[*]	Food and Drug Law	3.0
MIIM 521S[**]	Biotechniques I	2.0
	Term Credits	**9.0**

Total Credit: 9.0

[*] Other law electives are as follows: LAW 674S, LAW 703S, LSTU 501S, LSTU 504S, LSTU 505S, LSTU 507S

** Other science electives are as follows: MIIM 530S, MIIM 531S, MIIM 533S, MIIM 534S, MIIM 540S, MIIM 541S, MIIM 542S, MIIM 543S, MIIM 545S, MIIM 546S, MIIM 606S, MIIM 613S, MIIM 653S

Program Goals

Upon completion of the degree requirements for this MS program, students would have achieved the following program-level goals:

1. **Develop broad core knowledge in biological sciences and legal aspects of biomedical innovation**
   - Be proficient in fundamental concepts in molecular and cellular biology, and other major areas within the biological sciences
   - Be proficient in fundamental concepts in legal aspects in biomedical innovation
   - Be proficient in the process of biomedical innovation development and commercialization

2. **Develop analytical and critical thinking skills**
   - Be able to critically analyze the ideas and concepts related to science and legal aspects of biomedical research presented written or orally by others (e.g., textbooks, journals, mass media, presentations by peers and subject matter experts)
   - Be able to identify, analyze, and evaluate the need for innovative solutions to problems or challenges in biomedicine and innovation management
   - Be able to identify and analyze challenges faced in biomedical innovation development and management
   - Be able to discuss the commercial viability of innovative biomedical products (e.g., drugs, devices, diagnostics, digital media content)
   - Be able to draft and analyze strategic and tactical plans to deliver a biomedical product to the market
   - Be able to articulate and defend their analysis

3. **Develop research skills**
   - Be proficient at conducting primary research
   - Be proficient in collecting data from electronic databases, the World Wide Web, the library, and other sources
   - Be able to interpret data

4. **Develop professional ethics**
   - Be able to identify and evaluate professional ethical dilemmas, and discuss appropriate resolutions
   - Apply professional ethical standards such as appropriate attribution of ideas, good recordkeeping, and truthful presentation of data/facts and conclusions
   - Be able identify and evaluate the economic and social impact of strategic decisions

5. **Develop communication and leadership skills**
   - Be proficient at developing oral and/or written comprehensive reports, presenting facts, analysis, and conclusions
   - Be proficient at using appropriate technologies for communication
   - Be able to interact and work effectively with others in work settings involving cultural and demographic diversity

6. **Develop other "work readiness" soft skills**
   - Be knowledgeable of career opportunities in their desired field
   - Be proficient at presenting a professional profile of oneself
   - Be proficient at time-management
   - Be able to work in teams
   - Begin to develop problem-solving skills for use in the workplace
   - Begin to develop a professional network

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of (https://www.drexel.edu/provost/learningpriorities) Drexel's Student Learning Priorities (DSLPs) (http://www.drexel.edu/provost/irae/assessment/outcomes/dslp) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship and creative expression
- Responsible citizenship

Certificate in Medical Science Preparatory Program

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 47.0
Instructional Delivery: Campus
Calendar Type: Semester
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.1199
Standard Occupational Classification (SOC) Code:

Note: Effective Fall Semester 2015, no students will be accepted into this certificate program.

About the Program

The School of Biomedical Sciences and Professional Studies at Drexel University's College of Medicine offers the Medical Science Preparatory (MSP) program. The MSP certificate is a one-year program designed to help students enhance their credentials for application to medical or other health professional schools by improving their science background and admissions test scores, in particular the MCAT. This structured program offers both undergraduate and graduate level coursework as well as a formal two-semester MCAT course. Those students who successfully complete the program will receive a Certificate of Program Completion. Students may be considered for linkage with the following medical school programs:

Edward Via College of Osteopathic Medicine
Philadelphia College of Osteopathic Medicine
St. George's, University of London

St. George's of Grenada School of Medicine
Touro College of Osteopathic Medicine, New York
Universidad Autonoma de Guadalajara School of Medicine
University of Queensland School of Medicine

Medical Science Preparatory Curriculum
Students in the Medical Science Preparatory program are required to complete graduate level courses in anatomy, biochemistry, pharmacology, physiology, laboratory techniques and community outreach. Also included are undergraduate level courses in physics and chemistry and a formal MCAT preparation course.

For more information, visit Drexel's College of Medicine Medical Science Preparatory Program (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/Programs/PreMedicalPrograms/MedicalSciencePreparatoryMSPProgram.aspx) web page.

Master of Science Option
Those MSP students who successfully complete the program may elect to continue on to earn a Master of Science degree through the Master of Biological Science or Master of Interdisciplinary Health Sciences programs. Working towards a master's degree will continue to enhance one's credentials for application to medical or other health professionals schools.

Fall		Credits
MSPP 400S	Advanced Topics in Chemistry I	4.0
MSPP 402S	Advanced Topics in Physics I	4.0
MSPP 404S	Concepts in Science and Verbal Reasoning I	6.0
MSPP 505S	Lab Tech in Bioch Molec Biol	2.0
MSPP 511S	Concepts in Bioch Cell Biolo	4.0
PHRM 512S	Graduate Pharmacology	3.0
MSPP 525S	Community Dimensions of Medici	2.0
	Term Credits	**25.0**
Spring		
MSPP 401S	Advanced Topics in Chemistry II	4.0
MSPP 403S	Advanced Topics in Physics II	4.0
MSPP 405S	Concepts in Science and Verbal Reasoning II	6.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 515S	Biological Function Regulation	4.0
	Term Credits	**22.0**

Total Credit: 47.0

For more information about continuing on to the Master's of Biological Science, visit Drexel's College of Medicine Master of Biological Science (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/Programs/MasterofBiologicalScienceMBSProgram.aspx) web page.

Admission Requirements

Applicants to the Medical Science Preparatory (MSP) program must have earned a bachelor's degree from a US or other accredited institution. Prerequisite coursework must include a year of biology, chemistry, organic chemistry and physics with laboratory components.

The typical applicant should have a math/science GPA of 2.90 or better and an MCAT score of 18 or higher. The General Graduate Record Exam (GRE) will be accepted for those who have never taken the

MCAT. Applicants applying to other professional school programs may supply their discipline specific national aptitude exam scores (Ex., DAT, OAT, etc.). Our admissions process is holistic in nature and includes evaluations of letters of evaluation, community service and exposure in the health care field of interest.

The program's application can be found on the College of Medicine's Medical Science Preparatory Certificate Admissions (http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/MedicalSciencePreparatory.aspx) web page.

Certificate in Quantitative Principles for Clinical Research

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Graduate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completed: 1.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0000; 51.0719
Standard Occupational Classification (SOC) Code: 11-9111

This certificate of study addresses the needs of residents and fellows to attain knowledge in the basic principles of clinical research - analyzing data, understanding medical literature, and communicating results. All coursework is online, providing flexibility for the trainees and training programs.

Students completing this certificate can then apply to either the Clinical Research Organization and Management (http://drexel.com/crom) or the Clinical Research for Health Professionals (http://drexel.com/crhp) program to obtain an MS degree.

ADDITIONAL INFORMATION

Sara Perkel, MBA
Director, Graduate Programs in Clinical Research
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215-762-3812

Visit the Drexel University Online web site for additional information and to apply to the Quantitative Principals for Clinical Research (http://www.drexel.com/online-degrees/biomedical-degrees/qpcr) program.

Required Courses

CR 500S	Epidemiology	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 525S	Scientific Wriring and Medical Literature	3.0
Total Credits		**9.0**

Certificate in Veterinary Medical Science

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree
Certificate Type: Graduate Certificate

Number of Credits to Completion: 32.0
Instructional Delivery: Campus
Calendar Type: Semester
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.1104
Standard Occupational Classification (SOC) Code: 29-2056

Note: This program is currently not accepting students.

About the Program

The School of Biomedical Sciences and Professional Studies in the College of Medicine offers the Veterinary Medical Science (VMS) program. The VMS program is a one-year graduate level certificate program designed to help students enhance their credentials for veterinary medical school. It is intended for students who believe that their undergraduate performance did not fully reflect their academic abilities and who are now prepared to demonstrate they can excel.

Upon completion of the VMS certificate program, students have the option to continue their studies in the Master of Laboratory Animal Science (MLAS) program. In addition to further enhancing their academic credentials for veterinary medical school, earning the MLAS degree will allow students to pursue advanced careers in laboratory animal science or laboratory animal management.

Curriculum

The VMS curriculum consists of a unique combination of graduate level basic sciences courses, animal science courses, and medical school courses. VMS students are enrolled in several of the same first year medical school courses, as students from Drexel University College of Medicine (DUCOM). Success in this rigorous academic program can be viewed as an indicator of future potential in professional school.

Veterinary Medical School

Successful completion of the VMS program can significantly improve a student's academic credentials for application to veterinary medical school. Please review our website (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AnimalSciencePrograms/VeterinaryMedicalScience.aspx) for a comprehensive list of veterinary medical schools that have been attended by VMS and MLAS alumni.

Career Opportunities

In addition to attending veterinary medical school, VMS graduates have the option to continue their studies within the MLAS program. MLAS graduates hold positions in laboratory animal facilities of universities, biotechnology companies, government agencies, and pharmaceutical companies. There they serve as veterinarians, supervisors, managers, IACUC administrators, trainers, educators, consultants, and sales representatives.

Additional Information

Erin Vogelsong, MS
Academic Administrator, Assistant Professor
Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 N. 15th St., Room 15305
Philadelphia, PA 19102
215.762.7968

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Fall		Credits
IMSP 512S	Medical Biochemistry	8.0
IMSP 520S	Medical Physiology I	3.5
MLAS 525S	Animal Anatomy	2.0
MLAS 606S	Clinical Laboratory Techniques and Concepts	1.0
MSPA 580S	Medical Microbiology I	4.0
	Term Credits	**18.5**
Spring		
IMSP 521S	Medical Physiology II	3.5
MLAS 529S	Molecular Genetics	3.0
MLAS 530S	Biostats In Vet Science	3.0
MSPP 513S	Special Topics in Anatomy	4.0
	Term Credits	**13.5**

Total Credit: 32.0

Admissions Requirements

Students will be selected on the basis of adequate educational background and veterinary/ research/ animal care experience.

Prerequisite coursework includes: chemistry, biology, organic chemistry, and physics.

Candidates for admission must provide the following credentials:

- Bachelor's degree from an accredited U.S. college or university
- Cumulative GPA of 3.0 or higher
- General Graduate Record Exam (GRE) scores at or above the 60th percentile in all areas obtained within the last 5 years
- Official transcript from all post-secondary institutions attended
- Three letters of reference, two must be from science professors
- Personal statement stating the applicant's academic and professional goals

The deadline for submission of applications is the second Friday in July of the year the student seeks admission.

Certificate of Study in Clinical Research

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Graduate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 1.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0719
Standard Occupational Classification (SOC) Code: 11-9111

This part-time certificate program is a valuable professional resource for today's busy physicians, physician assistants, nurses, clinical fellows, research coordinators, and other individuals working in the clinical arena who want in-depth exposure to the skills and knowledge needed in the evolving clinical research field without having to commit to an entire

master's program. All courses are conducted online to accommodate the needs of working professionals.

This program requires the successful completion of five graduate courses. Credits earned in the certificate program are recognized towards the Master of Science in Clinical Research Organization and Management (http://drexel.com/crom).

ADDITIONAL INFORMATION

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Director, Graduate Programs in Clinical Research
sara.perkel@drexelmed.edu
215-762-3812

Visit the Drexel University Online site for additional program information and to apply to the certificate (http://drexel.com/cscr) program.

15.0 semester credits

Requirements

CR 515S	Intro to Clinical Trials	3.0
CR 545S	Pharmaceutical Law	3.0
CR 612S	Fundamentals of Compliance	3.0
Electives		
Select two of the following:		6.0
CR 565S	Contemporary Issues in Human Research Protection	
CR 570S	Principles and Practice of Pharmacovigilance	
CR 525S	Scientific Wriring and Medical Literature	
CR 609S	Innovative Product Development	
CR 620S	Biotech/Research	
CR 625S	Health Policy and Economics	
Total Credits		**15.0**

Evening Post-Baccalaureate Pre-Medical Certificate Program

Certificate Level: Undergraduate
Admissions Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 32.0
Instructional Delivery: Campus
Calendar Type: Semester
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.1199
Standard Occupational Classification (SOC) Code: 11-9121

Effective Fall 2015, this certificate program is transitioning to a non-degree preparatory program with no certificate.

About the Program

The School of Biomedical Sciences and Professional Studies at Drexel University's College of Medicine offers the part-time Evening Post-Baccalaureate Pre-Medical certificate. This program gives individuals who hold a non-science baccalaureate degree the opportunity to continue working while they take courses in the evening to prepare themselves for medical, veterinary, dental, podiatric, chiropractic, or other allied health professional schools. This program also affords the individual who took

science courses many years ago the opportunity to revisit the sciences. The structured program is the equivalent of five semesters completed in succession.

Linkage agreements have been established to allow students direct entry into medical school programs immediately after successful completion of the PMED program. These schools include Drexel University College of Medicine, Edward Via College of Osteopathic Medicine, Philadelphia College of Osteopathic Medicine, and the Robert Wood Johnson School of Medicine.

The curriculum offers the prerequisite science courses required by most health professional schools. During the first year, general chemistry and general physics with laboratories are offered. During the second year, students take organic chemistry and general biology in the summer and fall semesters. Outside of the program, the opportunity for students to take additional courses through Drexel University is available. Due to modifications beings made to the MCAT in 2015, a biochemistry course will be made available through the PMED program.

For more information, visit Drexel's College of Medicine Evening Post-Baccalaureate Pre-Medical Certificate Program (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/EveningPostBaccalaureatePreMedical.aspx) web page.

Required Courses

PMED 111S	General Chemistry I	3.0
PMED 112S	General Chemistry I Lab	1.0
PMED 121S	General Physics I	3.0
PMED 122S	General Physics I Lab	1.0
PMED 131S	General Chemistry II	3.0
PMED 132S	General Chemistry II Lab	1.0
PMED 141S	General Physics II	3.0
PMED 142S	General Physics II Lab	1.0
PMED 211S	General Biology I	3.0
PMED 212S	General Biology I Lab	1.0
PMED 221S	Organic Chemistry I	3.0
PMED 222S	Organic Chemistry I Lab	1.0
PMED 231S	General Biology II	3.0
PMED 232S	General Biology II Lab	1.0
PMED 241S	Organic Chemistry II	3.0
PMED 242S	Organic Chemistry II Lab	1.0
PMED 999S	Special Topics in Pre-Medical (ST: Psychology/Sociology)	3.0
PMED 999S	Special Topics in Pre-Medical (ST: Biochemistry)	3.0
PMED 999S	Special Topics in Pre-Medical (ST: Scientific Writing)	3.0
PMED 303S	Course PMED 303S Not Found	
PMED 302S	Biology of Cancer	
Total Credits		**41.0**

Admission Requirements

Students applying to the program must have a bachelor's degree from an accredited institution in the United States. Admission into the program is competitive because of the limited number of seats. Applicants are accepted on a rolling admissions basis.

An applicant should have a minimum combined SAT score of 1000 or ACT score of 21 and a minimum undergraduate grade point average of 3.00. For those individuals far removed from the college years, additional factors, or other more recent coursework, will be considered.

Applicants to the program should have at least 6.0 semester credits of coursework in English literature and the behavioral sciences (psychology, sociology, or philosophy), as that is a requirement for admission into most health professional schools. The opportunity exists within the program to acquire these courses if a student without these courses is accepted. A strong understanding of algebra and trigonometry is a prerequisite for the program. Calculus will also be beneficial.

The program's application can be found on the College of Medicine's Evening Post-Baccalaureate Pre-Med Certificate Admissions (http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/EveningPostBaccalaureatePremedical.aspx) web page.

Interdepartmental Medical Science

Major: Interdepartmental Medical Science
Degree Awarded: Master of Science
Calendar Type: Semester
Total Credit Hours: 72.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The Interdepartmental Medical Science program is a one-year MS degree granting program designed to help premedical students enhance either academic credentials for application to medical or other health professional schools. Students with an undergraduate GPA of 3.0 or higher can be considered for this program. In addition, applicants must have a minimum MCAT score of 27 (with no section less than 8), under the old system. Specific standards are being developed for the new MCAT but at this time, it is expected that students should have a composite score at the 75 percentile or better in order to be considered admission to the program. Students may be advised to sit for the MCAT an additional time following successful completion of the program if their entering MCAT score is not at a competitive level.

Admission Requirements

Students with an undergraduate GPA of 3.0 or higher can be considered for this program. In addition, applicants must have a minimum MCAT score of 27 (with no section less than 8), under the old system. Specific standards are being developed for the new MCAT but at this time, it is expected that students should have a composite score at the 75 percentile or better in order to be considered admission to the program.

Degree Requirements

Interdepartmental Medical Science

Required Courses

Fall Semester

IMSP 502S	Medicine and Society I	3.0
IMSP 512S	Medical Biochemistry	8.0
IMSP 520S	Medical Physiology I	3.5
IMSP 540S	Cell Biology & Microanatomy I	5.0

Optional courses		
IMSP 550S	Medical Nutrition [*]	
IMSP 570S	Medical Immunology [*]	
Spring Semester		
IMSP 503S	Medicine and Society II	2.0
IMSP 521S	Medical Physiology II	3.5
IMSP 541S	Cell Biology and Microanatomy II	3.0
IMSP 560S	Medical Neuroscience	6.0
Total Credits		**34.0**

[*]   These courses are optional.

[*]   These courses are optional.

Required Courses

IMSP 512S	Medical Biochemistry	8.0
IMSP 520S	Medical Physiology I	3.5
IMSP 540S	Cell Biology & Microanatomy I	5.0
IMSP 571S	Medical Nutrition I	0.5
IMSP 573S	Medical Immunology I	1.5
IMSP 502S	Medicine and Society I	3.0
IMSP 521S	Medical Physiology II	3.5
IMSP 541S	Cell Biology and Microanatomy II	3.0
IMSP 572S	Medical Nutrition II	0.5
IMSP 574S	Medical Immunology II	1.5
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 560S	Medical Neuroscience	6.0

Biotechnology

Major: Biotechnology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 40.0
Classification of Instructional Programs (CIP) code: 26.1201
Standard Occupational Classification (SOC) code: 11-9121; 19-1029

About the Program

The MS in Biotechnology program is designed to train laboratory personnel in the theory and practice of state-of-the art technologies for biochemical analysis. The program is targeted to individuals who will be seeking employment in biotechnology/pharmaceutical firms or academic laboratories and is appropriate for recent college graduates or experienced technicians. Graduates of this program will possess a set of technical skills that will make them very competitive for laboratory jobs in the academic or industrial sectors, or, if they are already employed, enhance their potential for advancement.

The program length is three semesters plus one summer session and includes both classes and hands-on practica.

About the Curriculum

The program consists of two parts:

1. A set of required didactic courses designed to provide students with the theoretical underpinnings of modern Biochemistry and Biotechnology. This knowledge will form a foundation for the hands-on aspects of the second portion of the curriculum.
2. A set of four hands-on practica providing detailed exposure and experience in four different aspects of biochemistry/biotechnology. Each practica will be conducted under the close supervision of a faculty member with expertise in the area, and will progress from an initial set of experiments in which the results are already known (allowing students to become familiar with techniques) then progressing to a project tightly associated with the ongoing research in the mentor's laboratory.

Practica during the fall and spring semesters will be 4.0 semester credit hours. The summer practicum will be 8.0 semester credit hours, and will include preparation of a scholarly paper that reviews a topic related to the techniques associated with that particular practicum. Possible practica themes include: protein expression and purification; crystallography; gene expression and manipulation; protein-protein and protein-ligand interaction with SPR; and imaging/microscopy.

Required Courses

BIOC 507S	Biochemistry Seminar Series [*]	3.0
BIOC 508S	Experimental Approaches to Biochemical Problems	4.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	1.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
Required Practica		
BIOC 513S	Biotechnology Practicum I	4.0
BIOC 514S	Biotechnology Practicum II [**]	8.0
BIOC 515S	Biotechnology Practicum III	4.0
BIOC 516S	Biotechnology Practicum IV	4.0
Total Credits		**40.0**

[*] Taken for one credit each term in fall, spring and summer for a total of 3.0 credits.

[**] The 8.0 credit Practicum is taken in the summer.

Admission Requirements

For acceptance to the program, the applicant must have completed a four-year biology or chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA. Students must fulfill all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee:

- official transcripts from all colleges and universities attended;
- official copies of entrance test scores and official test scores from the Graduate Record Examination (GRE);
- references from at least three instructors or professionals;
- an application fee, made payable to Drexel University is required for application processing (online application is free);
- International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by

submitting an acceptable score on the Test of English as a Foreign Language (TOEFL), or IELTS.

Students applying to the program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics-- including, at a minimum--two semesters each of inorganic chemistry, organic chemistry, physics, calculus and biology.

Visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/ducom) site for additional information regarding specific requirements for applying to the College of Medicine as well as important application dates.

Medical and Healthcare Simulation

Major: Medical Healthcare Simulation
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 39.0
Classification of Instructional Programs (CIP) code: 51.1199
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The goal of the MS in Medical Healthcare Simulation program is to educate healthcare professionals using simulation based methodology to bring a new level of standards and rigor in addition to creating new leaders to help shape the future of simulation education. The MS in Medical Healthcare Simulation program is a combination of both required and elective graduate courses, together with an intensive immersive educational experience. The majority of the educational experience will occur via an e-learning experience with a mandatory simulation laboratory experience.

Program Delivery

The curriculum is planned for a two-year time frame with each group to complete the curriculum as a cohort. However, the program may be extended, if appropriate, to accommodate part-time students or potential conflicts that might arise. These decisions will be determined by the program directors and in consultation with the student's mentor/advisor.

Admission Requirements

For acceptance into the MS in Medical and Healthcare Simulation program, the applicant must have, at a minimum, completed a four-year bachelor's degree, nursing degree program or equivalent, with a preferred GPA of 3.0 and must also have fulfilled all of the requirements for consideration as defined by the program committee.

All students must submit three confidential letters of evaluation and all previous official educational transcripts. If you have taken any standardized test, such as GRE and MCAT, the scores must be submitted for review. No standardized test is required for admission at this time. Each student will be assessed holistically based on the requirements by the program's committee.

As the degree program is directed toward medical simulation the background in medical care is required. The applicant must have graduated from medical school, or have a nursing or Bachelor's Degree or other health professional training (approved by the program director on individual basis) with an interest in simulation. A record of achievement in medical education, as provided by letters of reference, publications,

teaching evaluations, or prior specialized training or experience in medical education is desired, but not required.

Degree Requirements

Required Courses

MSMS 501S	Simulation Curriculum and Design I	3.0
MSMS 503S	Biostatistics in Healthcare Literature	3.0
MSMS 504S	Principles of Assessment: Measurement Theory, Assessment Principles & Tools	3.0
MSMS 506S	Debriefing in Simulation	3.0
MSMS 701S	Simulation Laboratory Practicum I	4.0
MSMS 702S	Simulation Laboratory Practicum II	4.0
MSMS 703S	Simulation Laboratory Practicum III	4.0
MSMS 801S	Capstone	3.0
Elective Courses		
Students must select a minimum of 12 credits from the following:		12.0
CR 510S	Sponsored Projects Finance	
CR 525S	Scientific Wriring and Medical Literature	
CR 550S	Leadership Skills	
CR 635S	Strategic Planning	
MSMS 507S	High Fidelity, Low Fidelity and Task Trainers	
MSMS 508S	Interprofessional Education	
MSMS 511S	Patient Safety and Simulation	
MSMS 600S	Adult Learning in Healthcare	
Total Credits		**39.0**

Sample Plan of Study

First Year

Term 1		Credits
MSMS 501S	Simulation Curriculum and Design I	3.0
MSMS 506S	Debriefing in Simulation	3.0
MSMS 701S	Simulation Laboratory Practicum I	4.0
	Term Credits	**10.0**
Term 2		
MSMS 503S	Biostatistics in Healthcare Literature	3.0
Two Medical and Healthcare Simulation electives[*]		6.0
	Term Credits	**9.0**

Second Year

Term 3		
MSMS 504S	Principles of Assessment: Measurement Theory, Assessment Principles Tools	3.0
MSMS 702S	Simulation Laboratory Practicum II	4.0
Medical and Healthcare Simulation elective[*]		3.0
	Term Credits	**10.0**
Term 4		
MSMS 801S	Capstone	3.0
MSMS 703S	Simulation Laboratory Practicum III	4.0

Medical and Healthcare Simulation elective[*]	3.0
Term Credits	**10.0**

Total Credit: 39.0

[*] For a list of Medical and Healthcare Simulation electives, view the program's degree requirements.

Laboratory Animal Science

Major: Laboratory Animal Science
Degree Awarded: Master of Laboratory Animal Science (MLAS)
Calendar Type: Semester
Total Credit Hours: 49.0
Classification of Instructional Programs (CIP) code: 51.2509
Standard Occupational Classification (SOC) code: 29-2056

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Laboratory Animal Science (MLAS) degree. The MLAS program is designed for individuals who have a bachelor's degree in animal science or a related field and who are seeking advanced career positions in laboratory animal science and laboratory animal facility management. Alternatively, the MLAS degree is also a powerful means to enhance students' credentials for admission to veterinary medical school.

The MLAS program is a full-time, two-year program that begins in August of each year. The first two years of the program consists primarily of classroom instruction, while the last semester is reserved for experiential learning. The program is flexible for traditional and non-traditional students alike due to the availability of evening courses.

Available Online

For individuals who are currently working in the laboratory animal science field, the MLAS program is available online as well. Please review our website (http://www.drexel.edu/medicine/Academics/Graduate-School/Master-of-Laboratory-Animal-Science/Online-MLAScience) for specific details about the online program.

Curriculum

The MLAS curriculum consists of basic science courses, laboratory animal science courses, and a practicum. The basic science courses were designed to build a solid foundation required for a successful career in laboratory animal science. The laboratory animal science courses focus on all aspects of laboratory animal science, including facility management. The practicum provides the student with the opportunity to apply the theoretical knowledge they have learned to the field of Laboratory Animal Science. The outcome is a highly trained laboratory animal science professional with a solid foundation in the sciences.

Practicum

MLAS faculty and administration assist the students in identifying and securing practicum sites at universities, biotechnology organizations, and pharmaceutical companies. Practicum sites are available in Pennsylvania, New Jersey, New York, Delaware, Virginia, Kentucky, North Carolina, and Texas. The list expands every year. In many instances, the practicum sites have offered our students a permanent position within their organization upon completion of the MLAS degree.

Career Opportunities

MLAS graduates hold positions in laboratory animal facilities of universities, biotechnology companies, government agencies, and pharmaceutical companies. There they serve as veterinarians, supervisors, managers, IACUC administrators, trainers, educators, consultants, and sales representatives.

Veterinary Medical School

Successful completion of the MLAS program can also significantly improve a student's academic credentials for application to veterinary medical school. Please review our website (http://www.drexel.edu/medicine/Academics/Graduate-School/Master-of-Laboratory-Animal-Science) for a comprehensive list of veterinary medical schools that have been attended by MLAS alumni.

Additional Information

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Drexel College of Medicine also maintains a Master of Laboratory Animal Science (http://www.drexel.edu/medicine/Academics/Graduate-School/Master-of-Laboratory-Animal-Science) website.

Admission Requirements

Students will be selected on the basis of adequate educational background and veterinary/ research/ animal care experience.

Prerequisite coursework includes: chemistry, biology, organic chemistry, and physics.

Candidates for admission must provide the following credentials:

- Bachelor's degree from an accredited U.S. college or university
- Cumulative GPA of 2.7 or higher
- General Graduate Record Exam (GRE) scores at or above the 50th percentile in all areas obtained within the last 5 years
- Official transcript from all post-secondary institutions attended
- Three letters of reference, two must be from science professors
- Personal statement stating the applicant's academic and professional goals

The deadline for submission of applications is the second Friday in July of the year the student seeks admission.

Contact Information:

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Degree Requirements

The MLAS degree can be completed full-time in two years and one summer practicum, or part-time in four or less years. Students must successfully complete a minimum of 49.0 credit hours for graduation. A minimum grade point average of 3.0 is required for graduation as well as grades of "C" or better.

Required Courses

MLAS 501S	Laboratory Animal Seminar	2.0
MLAS 510S	Clinical Orientation In Laboratory Animal Facilities	1.0
MLAS 520S	Financial Mgmt In Lab Anim Sci	3.0
MLAS 521S	Arch Eng & Plan For Anim Fac	4.0
MLAS 523S	Organizational Management	3.0
MLAS 525S	Animal Anatomy	2.0
MLAS 530S	Biostats In Vet Science	3.0
MLAS 535S	Biology & Care Of Lab Animals	4.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MLAS 606S	Clinical Laboratory Techniques and Concepts	1.0
MLAS 610S	Diseases of Laboratory Animals	3.0
MLAS 801S	Laboratory Animal Practicum	12.0
MSPA 580S	Medical Microbiology I	4.0
Electives		
Students must select a minimum of 6.0 credits from the following:		6.0
MLAS 500S	Animal Nutrition	
MLAS 513S	Biochemical Basis of Disease (Upenn)	
MLAS 514S	Hematopoiesis (Upenn)	
MLAS 529S	Molecular Genetics	
MLAS 531S	Embryology	
MLAS 545S	Fundamentals of Histology	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
Total Credits		**49.0**

Academic Medicine

Major: Academic Medicine
Degree Awarded: Master of Science
Calendar Type: Semester
Total Credit Hours: 36.0 + research based publication; Additional 25.0 credits for concentration in otolaryngology
Classification of Instructional Programs (CIP) code: 51.1199
Standard Occupational Classification (SOC) code: 25-1071

Note: This program is currently not accepting students.

About the Program

Exceptional residents often pursue scholarly activities in addition to fulfilling their other residency requirements. This program is designed for those residents who publish research and pursue scholarly activities in addition to their typical residency training, and who desire to pursue careers in clinical education in their field of interest.

Students pursuing an MS in Academic Medicine must designate a concentration. At this time the first available concentration is the field of otolaryngology.

The MS in Academic Medicine is designed to address topics of value to the academic physician, including training in leadership, education, ethics, professionalism, public health, health accreditation, statistics, bioepidemiology, research techniques, medical writing and editing, grant writing, research regulations, public speaking and academic health center management. These are topics typically important to educators, but not commonly covered in depth during residency training.

Goals and Objectives

The MS in academic medicine provides a structured pathway for physicians planning careers as clinical educators to acquire specialized knowledge and to demonstrate a special expertise in teaching. The objectives of the MS in Academic Medicine include:

- training young physicians to be skilled clinical educators;
- providing students with core knowledge about academic medicine that is not included systematically in residency training programs;
- encouraging research;
- exposing students to the process of supervising and mentoring research;
- encouraging life-long continued study of materials and methods for clinical education.

Examinations

All residents are required to take in-service training examinations annually. This is a national, standardized test provided for each clinical specialty. Performance at the 70th percentile or better in this examination is considered a passing grade for the MS. Alternatively, board certification would be sufficient to acknowledge that the student has mastered a body of knowledge suitable for the MS degree. Each clinical specialty has its own (very rigorous) requirements for board certification, supervised by the American Board of Medical Specialties.

Admission Requirements

Applications are reviewed by the department in which the degree is offered (for example: otolaryngology - head and neck surgery).

Recommendations for acceptance are presented to the Biomedical Graduate Education Committee of the College of Medicine for final approval. The requirements for admission include but are not limited to:

- enrollment in an ACGME approved residency program;
- satisfactory completion of at least one year of residency;
- a letter of recommendation from the applicant's Department Chair or Program Director;
- an interview in person;
- medical school transcript.

Visit the Office of Biomedical Graduate Studies Admissions website for more detailed information about applying to the program, including important application dates.

Degree Requirements

A minimum of thirty-six semester credits are required with a B average or better. Thus, the course of study for the MS in Academic Medicine will be in addition to the standard curriculum for residents plus the requirement of a research based, first authored publication.

Research Requirements

Each candidate for the MS will conduct a research project under the guidance of his/her advisory committee. In most cases this project will encompass clinical or bench research that will result in a first author publication in a peer-reviewed journal. (Case reports are not sufficient for fulfilling this requirement.) However if the student is involved in scholarly activity of another nature that is deemed sufficiently rigorous by the advisory committee, flexibility to recognize and accept other activities is intended. For example, such activities might include writing a book or developing the curriculum for a new academic program.

Curriculum

ACMD 600S	Academic Medicine: Core Knowledge I	3.0
ACMD 601S	Academic Medicine: Core Knowledge II	3.0
ACMD 602S	Academic Medicine Thesis Research	4.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 600S	Thesis Defense	9.0
Total Credits		**21.0**

A minimum of eleven elective credits are required for completion of the MS in Academic Medicine. Additional electives are encouraged. Electives may be selected from among the following courses. Other courses may be used to fulfill this requirement, with the approval of the candidates' advisory committee.

FIN 301	Introduction to Finance	4.0
COM 270 [WI (p. 77)]	Business Communication	3.0
ORGB 300 [WI (p. 77)]	Organizational Behavior	4.0
CAT 302	Customer Service Theory and Practice	3.0
CT 230	Web Development I	3.0
CT 240	Web Development II	3.0
COM 340	Desktop Publishing	3.0
CR 500S	Epidemiology	3.0
CR 511S	The History of Misconduct in Biomedical Research	3.0
CR 515S	Intro to Clinical Trials	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 525S	Scientific Wriring and Medical Literature	3.0
CR 535S	Current Federal Regulatory Issues in Biomedical Research	3.0
CR 545S	Pharmaceutical Law	3.0
CR 565S	Contemporary Issues in Human Research Protection	3.0
CR 600S	Designing the Clinical Trial	3.0
CR 609S	Innovative Product Development	3.0
CR 625S	Health Policy and Economics	3.0
PHRM 525S	Drug Discovery and Development I	3.0
PBHL 520	Principles of Biostatistics	4.0
PBHL 530	Principles of Epidemiology	4.0
PBHL 540	Prevention Principles and Practices	4.0
PBHL 600	Management, Leadership, Assurance and Health Services	3.0

PBHL 601	Management of Healthcare Outcomes	3.0
PBHL 605	Change Management in Public Health	3.0
PBHL 607	Evolution of United States Health Policy	3.0
PBHL 609	Issues in United States Health Policy	3.0
PBHL 622	Statistical Inference I	3.0
PBHL 650	Public Policy and Advocacy	3.0
PBHL 629	Design & Analysis of Clinical Trials	3.0

Biological Science

Major: Biological Science
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 83.0
Classification of Instructional Programs (CIP) code: 26-0101; 26-0102
Standard Occupational Classification (SOC) code: 19-1029

About the Program

The Master of Science in Biological Science (MBS) program now combines the former one-year Medical Science Preparatory (MSP) program curriculum with the Master of Science in Biological Science (MBS) curriculum into a two-year Master's program. The first year curriculum contains graduate-level biological science coursework, formal MCAT preparation/review, community outreach, and undergraduate review courses that cover chemistry, organic chemistry, and physics. The second year consists of a curriculum and benefits similar to the Interdepartmental Medical Science (IMS) Master's program. Students transition into the second year of the program after successful completion (3.0 GPA and no courses with grades less than a C) of the first year curriculum.

Additional Information

For more information about the program, visit the College of Medicine Master of Science in Biological Science (http://www.drexelmed.edu/Home/ AcademicPrograms/GraduateSchoolofBiomedSciencesProfStudies/ BiologicalScience.aspx) web page.

Required Undergraduate Courses

MSPP 400S	Advanced Topics in Chemistry I	4.0
MSPP 401S	Advanced Topics in Chemistry II	4.0
MSPP 402S	Advanced Topics in Physics I	4.0
MSPP 403S	Advanced Topics in Physics II	4.0
MSPP 404S	Concepts in Science and Verbal Reasoning I	6.0
MSPP 405S	Concepts in Science and Verbal Reasoning II	6.0
Required MS Courses		
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
MSPP 512S	Psychosocial and Behavioral Factors in Health and Medicine	3.0
MSPP 525S	Community Dimensions of Medici	2.0
MSPP 505S	Lab Tech in Bioch & Molec Biol	2.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 515S	Biological Function & Regulation	4.0
IMSP 502S	Medicine and Society I	3.0
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 513S	Biochemical Basis of Disease	8.0
IMSP 522S	Function of the Human Body I	3.5

IMSP 523S	Function of the Human Body II	3.5
IMSP 542S	Cell Biology and Histology I	5.0
IMSP 543S	Cell Biology and Histology II	3.0
IMSP 560S	Medical Neuroscience	6.0
Summer Research Project		
MSPP 550S	Research Project	2.0
Additional Non-required Courses		
IMSP 544S	Basic Immunology I	1.5
IMSP 545S	Basic Immunology II	1.5
IMSP 552S	Fundamentals of Nutrition and Diet	1.0
Total Credits		**87.0**

Degree Requirements

Fall		Credits
MSPP 400S	Advanced Topics in Chemistry I	4.0
MSPP 402S	Advanced Topics in Physics I	4.0
MSPP 404S	Concepts in Science and Verbal Reasoning I	6.0
MSPP 505S	Lab Tech in Bioch Molec Biol	2.0
MSPP 511S	Concepts in Bioch Cell Biolo	4.0
PHRM 512S	Graduate Pharmacology	3.0
MSPP 525S	Community Dimensions of Medici	2.0
	Term Credits	**25.0**
Spring		
MSPP 401S	Advanced Topics in Chemistry II	4.0
MSPP 403S	Advanced Topics in Physics II	4.0
MSPP 405S	Concepts in Science and Verbal Reasoning II	6.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 515S	Biological Function Regulation	4.0
	Term Credits	**22.0**

Total Credit: 47.0

Required Undergraduate Courses

MSPP 400S	Advanced Topics in Chemistry I	4.0
MSPP 401S	Advanced Topics in Chemistry II	4.0
MSPP 402S	Advanced Topics in Physics I	4.0
MSPP 403S	Advanced Topics in Physics II	4.0
MSPP 404S	Concepts in Science and Verbal Reasoning I	6.0
MSPP 405S	Concepts in Science and Verbal Reasoning II	6.0
Required MS Courses		
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
MSPP 512S	Psychosocial and Behavioral Factors in Health and Medicine	3.0
MSPP 525S	Community Dimensions of Medici	2.0
MSPP 505S	Lab Tech in Bioch & Molec Biol	2.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 515S	Biological Function & Regulation	4.0
IMSP 502S	Medicine and Society I	3.0
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 513S	Biochemical Basis of Disease	8.0
IMSP 522S	Function of the Human Body I	3.5
IMSP 523S	Function of the Human Body II	3.5
IMSP 542S	Cell Biology and Histology I	5.0

IMSP 543S	Cell Biology and Histology II	3.0
IMSP 560S	Medical Neuroscience	6.0
Summer Research Project		
MSPP 550S	Research Project	2.0
Additional Non-required Courses		
IMSP 544S	Basic Immunology I	1.5
IMSP 545S	Basic Immunology II	1.5
IMSP 552S	Fundamentals of Nutrition and Diet	1.0
Total Credits		**87.0**

Cancer Biology

Major: Cancer Biology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 40.0-43.0
Classification of Instructional Programs (CIP) code: 26.0911
Standard Occupational Classification (SOC) code: 19-1042

About the Program

The goal of the MS in Cancer Biology program is to provide a master's degree focused on the fundamentals of cancer from an interdisciplinary perspective, including:

- biology and molecular biology of cancer initiation;
- metastasis;
- treatment; and
- bioinformatics/systems biology.

The program is designed to meet the needs of two groups of individuals: (1) new or recent college graduates who wish to increase their marketability for jobs in academic or industrial laboratories through the acquisition of knowledge and skills more developed than obtained through a standard college curriculum; and (2) currently employed technical staff in the pharmaceutical or biotechnology industry (or academia) who wish to advance their position.

Consisting of both classroom and laboratory instruction, the program fills a need to train laboratory personnel in cancer theory and research. Graduates of this program will possess knowledge in both the theoretical as well as the practical level.

Additional Information

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Admission Requirements

For acceptance to the program, the applicant must have completed a four-year biology or chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA. Students must fulfill all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee:

- official transcripts from all colleges and universities attended;
- official copies of entrance test scores and official test scores from the Graduate Record Examination (GRE);
- references from at least three instructors or professionals;
- an application fee, made payable to Drexel University is required for application processing (online application is free);
- International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL), or IELTS.

Students applying to the program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics--including, at a minimum--two semesters each of inorganic chemistry, organic chemistry, physics, calculus and biology.

Visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/ducom) site for additional information regarding specific requirements for applying to the College of Medicine as well as important application dates.

Degree Requirements: Thesis Option

43.0 semester credits
Each semester, throughout the two years, there will be a weekly Cancer Journal Club. Students will also attend the Molecular & Cell Biology & Genetics (MCBG) Seminar series. Each semester contains a research component.

The Thesis Option of this program based on research can be initiated at the end of the first year.

Required Courses		
BIOC 510S	Cancer Biology	3.0
BIOC 512S	Advanced Cancer Biology	2.0
CBIO 500S	Core Cancer Topics	2.0
CBIO 503S	Cancer Biology Journal Club	1.0
CBIO 504S	Cancer Biology 1st Lab Rotation	4.0
CBIO 505S	Cancer Biology 2nd Lab Rotation	2.0
CBIO 506S	Cancer Biology Thesis Research	9.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
Suggested Electives [*]		
Select a minimum of 5.0 credits of electives:		5.0
BIOC 508S	Experimental Approaches to Biochemical Problems	
CBIO 501S	Infection, Inflammation and Cancer	
CBIO 508S	Cancer Biomarkers and Therapeutics	
MCBG 506S	ADVANCED CELL BIOLOGY	
MCBG 514S	Cell Cycle and Apoptosis	
PHRM 525S	Drug Discovery and Development I	
PBHL 633	Epidemiology of Cancer	
Total Credits		**43.0**

Degree Requirements: Non-Thesis Option

40.0 semester credits

Required Courses

BIOC 510S	Cancer Biology	3.0
BIOC 512S	Advanced Cancer Biology	2.0
CBIO 500S	Core Cancer Topics	2.0
CBIO 503S	Cancer Biology Journal Club (May be repeated for credit)	1.0
CBIO 504S	Cancer Biology 1st Lab Rotation	4.0
CBIO 505S	Cancer Biology 2nd Lab Rotation	2.0
CBIO 507S	Special Topics in Cancer Biology	9.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
Suggested Electives [*]		4.0
Select a minimum of 4.0 credits of electives.		
BIOC 508S	Experimental Approaches to Biochemical Problems	
CBIO 501S	Infection, Inflammation and Cancer	
CBIO 508S	Cancer Biomarkers and Therapeutics	
MCBG 506S	ADVANCED CELL BIOLOGY	
MCBG 514S	Cell Cycle and Apoptosis	
PHRM 525S	Drug Discovery and Development I	
PBHL 633	Epidemiology of Cancer	
Total Credits		**40.0**

[*] Students can select a course from the list of suggested electives or by approval from the Program Director.

Clinical Research Organization and Management

Major: Clinical Research Organization and Management
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 51.0000
Standard Occupational Classification (SOC) code: 11-9199

About the Program

The Master of Science in Clinical Research Organization and Management is an online program designed both for individuals already trained in the area of clinical sciences, as well as for others who desire a focused education in the proper conduct of clinical research.

The Master of Science in Clinical Research Organization and Management program offers students a rigorous graduate education taught by leaders from the pharmaceutical, biotechnology and medical device industries, as well as from academic research centers.
The program provides online courses that include scientific rationale related to the design and analysis of clinical trials, epidemiology and biostatistics, ethics-based reasoning for the conduct of research, clinical trial management and monitoring processes, and federal regulatory rules and policies essential to the development of a broadly-educated and well-prepared professional in clinical research and new therapeutic product investigation.

The program is designed so that graduates will be able to:

- Successfully apply the framework and philosophies of research to the management of clinical trials, employing quality principles of current good clinical practice to produce valid and useful data;
- Ensure that sound ethical principles and values are always recognized and upheld in research involving a human population;
- Use current statistical knowledge and methods in the design, implementation, conduct, and assessment of clinical trial management; and
- Describe the scientific and clinical research literature to effectively interpret the results of clinical research, thereby enhancing the decision-making process.

Students work with advisors to customize their course plans to meet their career goals.

Program Delivery Options

All Clinical Research (CR) courses are offered solely online. Visit Drexel University Online for details.

Additional Information

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For more information about the program, visit the Master of Science in Clinical Research Organization and Management (http://drexel.com/crom) page on the Drexel University Online site.

For information about applying to the program, visit the Drexel University Online Admissions Criteria (http://www.drexel.com/online-degrees/biomedical-degrees/ms-crom/admissions.aspx) web page.

Degree Requirements

The Master of Science in Clinical Research Organization and Management program consists of 12 courses (36.0 credits). Any courses offered by the Clinical Research Organization Management program may be applied to fulfill the requirements of this major. No master's thesis is required.

The program is organized into five areas of study devoted to clinical research and related administrative and regulatory issues. Students may take courses within their preferred area of study, a cross-section of courses within other areas of study, or any other Clinical Research (CR) courses being offered.

New Product Research and Development

CR 513S	Pharmaceutical R&D: Business Process and Information Flow	3.0
CR 514S	World Wide Regulatory Submissions	3.0
CR 515S	Intro to Clinical Trials	3.0
CR 609S	Innovative Product Development	3.0
CR 620S	Biotech/Research	3.0
Regulatory Compliance, Ethics and Law		
CR 505S	Ethical Issues in Research	3.0

CR 511S	The History of Misconduct in Biomedical Research	3.0
CR 535S	Current Federal Regulatory Issues in Biomedical Research	3.0
CR 555S	COMPLIANCE & MONITORING ISSUES	3.0
CR 565S	Contemporary Issues in Human Research Protection	3.0
CR 633S	Quaility Assurance Audits	3.0
CR 612S	Fundamentals of Compliance	3.0
CR 545S	Pharmaceutical Law	3.0
Biostatistics and Data Management		
CR 500S	Epidemiology	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 560S	Special Topics	3.0
CR 600S	Designing the Clinical Trial	3.0
Clinical Research Management and Safety Surveillance		
CR 512S	Fundamentals of Academic Research Administration	3.0
CR 525S	Scientific Wriring and Medical Literature	3.0
CR 625S	Health Policy and Economics	3.0
New Therapeutic Product Business and Strategic Planning		
CR 530S	Tech Transfer	3.0
CR 635S	Strategic Planning	3.0
CR 550S	Leadership Skills	3.0

Clinical Research for Health Professionals

Major: Clinical Research for Health Professionals
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 51.0000
Standard Occupational Classification (SOC) code: 11-9199

About the Program

The MS in Clinical Research for Health Professionals program is a non-thesis curriculum designed for residents, fellows, and clinicians seeking knowledge in the conduct of translational and pharmaceutical research. The degree often acts as an advanced preparation for independent investigators and other practicing researchers familiar with the industry, while developing their clinical careers.

The program is also available to other clinical health professionals such as nurses (with a minimum of a bachelor's degree required), audiologists, etc., to help these individuals advance their professional opportunities.

Online course work coupled with supervised research activities will allow health care professionals in any academic hospital setting throughout the US to receive an MS degree from Drexel University College of Medicine (DUCoM).

Research Project

While the MS in Clinical Research for Health Professionals program does not require a thesis, the program is consistent with a master's level education that challenges students to clearly express well-organized thoughts in written form. The collection, analysis and refinement of scientific information to produce a professional-level written document are crucial skills for those in the health professions. This requirement will expose students to the entire process of developing a research project and reporting on that research project up to and including experiencing a facsimile of the peer review and re-submission process.

It is anticipated that each student will conduct a minimum of nine hours research per week for 3.0 credits per semester. Research may include a broad spectrum of clinical studies such as: retrospective studies; bench-top studies in conjunction or not with pharmaceutical companies; development of new clinical methodologies/techniques; or, development/evaluation of new clinical devices. Research mentors must be established researchers with a doctoral degree. A curriculum vitae of the proposed research mentor must be submitted with the student's application for evaluation by the admissions committee and the program director. The appropriateness of the mentor will be evaluated by an ad hoc committee whose members come from the Graduate School faculty. The student must submit a 7-10 page journal-format paper at the end of each semester documenting their research and demonstrating that each successive semester's work builds upon their prior work.

For more information about the program and to apply, visit the Drexel University Online (http://drexel.com/crhp) site.

Additional Information

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215-762-3812

Degree Requirements

The MS in Clinical Research for Health Professionals program requires completing a minimum of 15.0 semester credits, composed of three required courses and two clinical research electives. In addition, students will register for a total of 21.0 research credits.

Curriculum		
Select three of the following:		9.0
CR 500S	Epidemiology	
CR 515S	Intro to Clinical Trials	
CR 520S	Applications of Clinical Research Biostatistics	
CR 525S	Scientific Wriring and Medical Literature	
CR 612S	Fundamentals of Compliance	
CR 545S	Pharmaceutical Law	
Select two of the following:		6.0
CR 500S	Epidemiology	
CR 501S	Emerging Trends in Medical Device History	
CR 505S	Ethical Issues in Research	
CR 511S	The History of Misconduct in Biomedical Research	
CR 512S	Fundamentals of Academic Research Administration	
CR 515S	Intro to Clinical Trials	
CR 520S	Applications of Clinical Research Biostatistics	
CR 525S	Scientific Wriring and Medical Literature	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 545S	Pharmaceutical Law	
CR 565S	Contemporary Issues in Human Research Protection	

CR 570S	Principles and Practice of Pharmacovigilance	
CR 600S	Designing the Clinical Trial	
CR 609S	Innovative Product Development	
CR 612S	Fundamentals of Compliance	
CR 614S	Pharmacotherapy in New Drug R&D	
CR 616S	Intro to Therapeutic Products	
CR 617S	Informatics in Pharm Res & Development	
CR 620S	Biotech/Research	
CR 625S	Health Policy and Economics	
CR 999S	Special Topics	
Research/Journal-type paper requirement (min 21.0 credits)		
Each student conducts a minimum of 9 hours research/week for 3 credits per semester [*]		
CRHP 501S	Research Health Professions I	3.0
CRHP 502S	Research Health Professions II	3.0
CRHP 503S	Research Health Professions III	3.0
CRHP 504S	Research Health Professions IV	3.0
CRHP 505S	Research Health Professions V	3.0
CRHP 506S	Research Health Professions VI	3.0
CRHP 507S	Research Health Professions VII	3.0
Total Credits		**36.0**

[*] Research may include a broad spectrum of clinical studies such as: retrospective studies; bench-top studies in conjunction or not with pharmaceutical companies; development of new clinical methodologies/ techniques; or, development/evaluation of new clinical devices.

Research mentors must be established researchers with a doctoral degree. A curriculum vitae of the proposed research mentor must be submitted with the student's application. The appropriateness of the mentor will be evaluated by an ad hoc committee whose members come from the Graduate School faculty.

The student must submit a 7-10 page journal-format paper at the end of each semester documenting their research and demonstrating that each successive semester's work builds upon their prior work. Contact the program director for additional requirements.

Criminalistic Science

Major: Criminalistic Science
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 49.0
Classification of Instructional Programs (CIP) code: 43.0111
Standard Occupational Classification (SOC) code: 19-4092; 33-3021

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Science in Criminalistic Science. The Master of Science in Criminalistic Science is designed to introduce students to the basic principles of Criminalistic Science while also providing opportunities to pursue either more traditional and/or more innovative concentrations of study.

Criminalistics is defined as the scientific study and analysis of crime scenes and the evidence within those scenes to solve a crime and apprehend the perpetrator of the crime. The disciplines within criminalistics are science based, with most using multiple combinations of the natural sciences to conduct examinations and analysis of evidence and crime scenes.

In addition to required courses in criminal law, trial process and the use of evidence, the Master of Science in Criminalistic Science program offers courses in fingerprint science, forensic engineering, motor vehicle crash reconstruction, firearms and tool mark analysis, fire and explosion analysis, footwear and tire track analysis, bloodstain pattern analysis, trace materials and forensic geology and botany, and nuclear, biological, chemical terrorism/mass disaster management.

Admission Requirements

Applicants must have a bachelor's degree from an accredited US college or university or its equivalent. Official general GRE and/or MCAT scores are required for admission. Typical applicants would have a minimum 2.5 GPA.

Selection is based upon academic qualifications, standardized test scores, references, an evaluation of the candidate's goals and commitment, and a telephone interview.

Each applicant's academic record will be evaluated based upon its individual merits. Since consideration for employment within the field of criminalistic science necessitates the absence of a criminal background, it is expected that all individuals applying to this program will have no history of criminal behavior, including prior illicit drug and/or prescription drug abuse.

For additional information on how to apply for this program, contact:

Ms. Thelicia Hill
215.762.4674
thelicia.hill@drexelmed.edu (thelicia.hill@drexel.edu)

Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
Master of Criminalistic Science Program
Mail Stop 344, 245 North 15th Street
Philadelphia, PA 19102-1192

Degree Requirements

Required Courses:

FCA 505S	Physical Aspects of Forensic Science	3.0
FCA 506S	Medico-legal Death Investigation	2.0
FCA 507S	Gross Human Skeleton I	1.0
FCA 508S	Gross Human Skeleton II	1.0
IHS 513S	Introduction to Scientific Writing	2.0
MFSP 550S	Biological Aspects of the Forensic Sciences	2.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	2.0
MFSP 559S	Criminal Law and the Court: Use of Evidence I	2.0
MFSP 560S	Criminal Law and the Court: Use of Evidence II	2.0
MFSP 561S	Techniques of Crime Scene Investigation	3.0
MFSP 575S	Introduction to Criminal Law and Trial Process	3.0
MFSP 576S	Ethics for the Forensic Scientist	2.0
Elective Courses		
Twenty-four credits chosen from the following electives:		24.0

MFSP 593S	Cyber Crime
MFSP 563S	Latent Fingerprint Analysis
MFSP 578S	Forensic Photography
MFSP 590S	Homicide Investigation
MFSP 571S	Bloodstain Pattern Analysis
MFSP 568S	Vehicle Accident Reconstruction and Analysis
MFSP 562S	Arson and Explosive Analysis
MFSP 565S	Firearms and Tool Mark Analysis
MFSP 566S	Techniques of interview and interrogation
MFSP 569S	Footwear and Tire Track Analysis
MFSP 570S	Nuclear/Biological/Chemical Terrorism
MFSP 591S	Criminal Investigative Analysis I
MFSP 595S	Criminal Investigative Analysis II
MFSP 596S	Advanced Vehicle Accident Analysis
Total Credits	**49.0**

Drexel Pathway to Medical School

Major: Drexel Pathway to Medical School
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 47.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 19-1029

About the Program

This intensive, one-year master's degree program provides qualifying candidates a conditional acceptance for matriculation into Drexel University's College of Medicine following successful completion of the program. Small-group instruction is provided during the intensive introductory summer enrichment portion of the curriculum and individual counseling with an administrative advocate is available throughout the program.

More information:

Drexel University College of Medicine
Division of Pre-medical and Pre-health Programs
Graduate School of Biomedical Sciences and Professional Studies
New College Building, Room 4104
245 North 15th Street, Mail Stop 344
Philadelphia, PA 19102

Phone: 215-762-4692
Email: medicalsciences@drexelmed.edu (http://catalog.drexel.edu/graduate/schoolofbiomedicalsciences/drexelpathwaytomedicalschool/mail:medicalsciences@drexelmed.edu)

Visit the Drexel University College of Medicine's website: Drexel Pathway to Medical School Program (http://www.drexelmed.edu/Home/AcademicPrograms/GraduateSchoolofBiomedSciencesProfStudies/DrexelPathwaytoMedicalSchool.aspx).

Admission Requirements

The program is open to all premedical students who have successfully completed the prerequisite coursework for medical school with a grade of C or better. A minimum 2.90 cumulative and sciences undergraduate GPA is required for application to the program, as well as a total MCAT score

of 25 (former exam format) with no score in any section less than 8, or a total 45% percentile (new MCAT format) with no subsection less than 45% percentile, subject to change. Applicants who meet these requirements are considered for an interview by the admissions committee of the College of Medicine.

Degree Requirements

Required Courses

DPMS 500S	Medical Science Preparation	1.0
DPMS 501S	Critical Thinking and Scientific Communication Seminar	2.0
DPMS 502S	Accelerated Introductory Medical Biostatistics	3.0
IMSP 513S	Biochemical Basis of Disease	8.0
MSPA 520S	Medical Terminology	3.0
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 522S	Function of the Human Body I	3.5
IMSP 523S	Function of the Human Body II	3.5
IMSP 542S	Cell Biology and Histology I	5.0
MSPP 513S	Special Topics in Anatomy	4.0
Electives		**12.0**
DPMS 503S	Neurobiology of Mental Illness	
DPMS 504S	Functional Neuroanatomy	
IMSP 544S	Basic Immunology I	
IMSP 545S	Basic Immunology II	
MSPP 404S	Concepts in Science and Verbal Reasoning I	
MSPP 405S	Concepts in Science and Verbal Reasoning II	
Total Credits		**47.0**

Sample Plan of Study

Term 1		Credits
DPMS 500S	Medical Science Preparation	1.0
DPMS 501S	Critical Thinking and Scientific Communication Seminar	2.0
DPMS 502S	Accelerated Introductory Medical Biostatistics	3.0
MSPA 520S	Medical Terminology	3.0
	Term Credits	**9.0**
Term 2		
IMSP 513S	Biochemical Basis of Disease	8.0
IMSP 522S	Function of the Human Body I	3.5
IMSP 542S	Cell Biology and Histology I	5.0
Electives - Select from list below:		6.0
DPMS 503S	Neurobiology of Mental Illness	
IMSP 544S	Basic Immunology I	
MSPP 404S	Concepts in Science and Verbal Reasoning I	
	Term Credits	**22.5**
Term 3		
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 523S	Function of the Human Body II	3.5
MSPP 513S	Special Topics in Anatomy	4.0
Electives - Select from list below:		6.0

DPMS 504S	Functional Neuroanatomy	
IMSP 545S	Basic Immunology II	
MSPP 405S	Concepts in Science and Verbal Reasoning II	
	Term Credits	**15.5**

Total Credit: 47.0

Drug Discovery and Development

Major: Drug Discovery and Development
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 38.0
Classification of Instructional Programs (CIP) code: 26.1001
Standard Occupational Classification (SOC) code: 19-1029

About the Program

The MS in Drug Discovery and Development program provides in-depth exposure to the multiple elements involved in drug discovery and development. This program has been designed to prepare students for a smooth transition into an enduring and productive research career within the pharmaceutical and biotechnology industry. It covers all aspects of drug discovery and development ranging from the discovery and characterization of drug targets through to regulatory approval and commercialization. Students will also be exposed to business aspects as well as to other areas of biotechnology and to the basic sciences of pharmacology and physiology.

The MS in Drug Discovery and Development is available to individuals who have already obtained a BS or BA degree in some field of the biomedical or health sciences who may wish to pursue an industry-focused master's-level degree. This may include individuals who wish to pursue a career in the pharmaceutical or biotechnical industries.

This program is also intended for individuals from other disciplines who wish to have a broader base of information about drug discovery and development, those who may wish to transition into the industry, or those who are already active in the industry and seek to increase their knowledge. The curriculum has been designed with the recognition that the complex pharmaceutical and biotechnical industries require a diversity of personnel experience.

For more information about this program, visit the College of Medicine's Biomedical Graduate Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/Drug-Discovery-Development) page.

Admission Requirements

For acceptance to the program, the applicant must have completed a four-year biology or chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA. Students must fulfill all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee:

- official transcripts from all colleges and universities attended;
- official copies of entrance test scores and official test scores from the Graduate Record Examination (GRE);
- references from at least three instructors or professionals;
- an application fee, made payable to Drexel University is required for application processing (online application is free);

- International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL), or IELTS.

Students applying to the program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics--including, at a minimum--two semesters each of inorganic chemistry, organic chemistry, physics, calculus and biology.

Visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/ducom) site for additional information regarding specific requirements for applying to the College of Medicine as well as important application dates.

For additional information on how to apply, visit Drexel's Admissions page for Biomedical Graduate Studies (http://www.drexel.edu/grad/programs/ducom/apply).

Degree Requirements

The curriculum is designed to provide students with a detailed core focusing on the many facets of the drug discovery and development process, while simultaneously providing students with multiple options to pursue related areas of interest.

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
or IDPT 501S	Biostatistics I	
PHRM 512S	Graduate Pharmacology	3.0
PHRM 525S	Drug Discovery and Development I	3.0
PHRM 526S	Drug Discovery and Development II	3.0
PHRM 605S	Research in Drug Discovery and Development	4.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0
PHRM 502S	Current Topics in Pharmacology & Physiology	1.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
Electives [*]		14.0
Elective Options		
MIIM 521S	Biotechniques I	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 530S	Fundamentals of Molecular Medicine I	
MIIM 531S	Fundamentals of Molecular Medicine II	
MLAS 536S	Animal Models for Biomedical Research	
NEUR 508S	Graduate Neuroscience I	
MIIM 508S	Immunology I	
BIOC 510S	Cancer Biology	
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	
PHRM 503S	Pharm & Phys 1st Lab Rotation	
PHRM 507S	Prin of Neuropharmacology	
PHRM 518S	New Frontiers in Therapy	
PHRM 519S	Methods in Biomedical Research	
Quarter Elective Course Options (must be approved by advisor)		
BIO 631	Bioinformatics I	

MGMT 685	Implementing Strategies Using Project Teams	
MGMT 910	Readings in Strategic Management	
PROJ 501	Introduction to Project Management	
PROJ 535	International Project Management	
PBHL 530	Principles of Epidemiology	
BMES 604	Pharmacogenomics	
MGMT 940	Seminar in Organizational Behavior	
ORGB 625	Leadership and Professional Development	
Total Credits		**38.0**

*   Courses that are not listed above may be taken as electives only with the approval of the program director.

Forensic Science

Major: Forensic Science
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 43.0106
Standard Occupational Classification (SOC) code: 19-4092

About the Program

The Graduate School of Biomedical Sciences and Professional Studies offers the Master of Science in Forensic Science. The curriculum is designed to provide students with a set of core courses that serve as an introduction to the many facets of forensic science as well as an essential foundation for several more specialized disciplines in the field. There are multiple options for specialization, and courses required for each of the concentrations enable students to acquire specialized knowledge on topics that are directly related to their specific areas of interest and career goals.

For more information about this program, visit the College of Medicine's Master of Science in Forensic Science (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/ForensicScienceProfessionalPrograms/MasterofForensicScienceMFSProgram.aspx) web page.

Admission Requirements

The forensic program is limited to those students whose undergraduate degree contains a strong background in the natural sciences. The program is designed to attract students at a multidisciplinary level. Students are required to have an undergraduate degree in the natural sciences. A minimum of 3.0 GPA on a 4.0 system is desired; however, supplemental materials and overall experience are factored into the acceptance process. The following must be submitted for consideration:

- Application with $65.00 fee
- Official transcripts from each college and/or university attended
- Three letters of recommendation
- Official MCAT or GRE test scores

Contact information

For additional information on how to apply for this program, contact:

Ms. Amanda Mangano
215.762.8217

amangano@drexelmed.edu (thelicia.hill@drexel.edu)

Graduate School of Biomedical Sciences and Professional Studies
Drexel University College of Medicine
Forensic Science Program
245 North 15th Street
Mail Stop 344, Rm. 4104
Philadelphia, PA 19102-1192

Degree Requirements

Requirements

Required Core Courses:

MFSP 550S	Biological Aspects of the Forensic Sciences	2.0
MFSP 557S	Drug Chemistry	2.0
MFSP 561S	Techniques of Crime Scene Investigation	3.0
MFSP 572S	Forensic Research Project I	3.0
MFSP 573S	Forensic Research Project II	1.5
MFSP 574S	Forensic Research Paper	1.0
MFSP 575S	Introduction to Criminal Law and Trial Process	3.0
MFSP 576S	Ethics for the Forensic Scientist	2.0
MFSP 592S	Forensic Graduate Seminar	1.5
MFSP 602S	Professional Courtroom Testimony & Moot Court	3.0
MFSP 564S	Forensic Comparative Science	3.0
MFSP 540S	Basic Laboratory Techniques and Quality Assurance/Quality Control	2.0
Concentrations-Complete one concentration and free electives for a total of 18 credits		18.0
Criminalistic Concentration:		
MFSP 562S	Arson and Explosive Analysis	
MFSP 563S	Latent Fingerprint Analysis	
MFSP 571S	Bloodstain Pattern Analysis	
MFSP 565S	Firearms and Tool Mark Analysis	
MFSP 578S	Forensic Photography	
Molecular Biology Concentration		
MFSP 577S	Genetics for the Forensic Scientist	
MFSP 589S	Forensic DNA Analysis	
IDPT 501S	Biostatistics I	
IHS 514S	Molecular Biology & Biochemistry of the Cell	
MFSP 597S	Forensic Serology	
Forensic Medicine Concentration		
MFSP 583S	The Autopsy in Clinical Forensic Medicine	
MFSP 584S	Introduction to Forensic Radiology	
MFSP 585S	Clinical Forensic Emergency Medicine and Traumatology	
MFSP 551S	Human Function	
MFSP 601S	Human Structure With Lab	
Chemistry Concentration		
MFSP 558S	Instrumental Analysis	
CHEM 530	Analytical Chemistry I [*]	
CHEM 531	Analytical Chemistry II [*]	
CHEM 541	Organic Chemistry I [*]	
CHEM 755	Mass Spectrometry [*]	

CHEM 789	Experimental Design and Statistics in Chemistry [*]

Elective Courses:

Students select electives from the following list with the approval of a program director.

IHS 513S	Introduction to Scientific Writing
MFSP 554S	Principles of Forensic Pathology
MFSP 555S	Forensic Sciences Summer Practicum
MFSP 556S	Forensic Anthropology and Topics in Human Identification
MFSP 566S	Techniques of interview and interrogation
MFSP 568S	Vehicle Accident Reconstruction and Analysis
MFSP 569S	Footwear and Tire Track Analysis
MFSP 570S	Nuclear/Biological/Chemical Terrorism
MFSP 579S	Forensic Microbiology
MFSP 580S	Principles of Immunology
MFSP 581S	Human Osteology and Calcified Tissue Biology I
MFSP 582S	Human Osteology and Calcified Tissue Biology II
MFSP 586S	Introduction to Forensic Pediatrics
MFSP 587S	Introduction to Forensic Psychology
MFSP 588S	Special Topics in Cell Biology
MFSP 590S	Homicide Investigation
MFSP 591S	Criminal Investigative Analysis I
MFSP 593S	Cyber Crime

Total Credits	**45.0**

[*] Course numbers that do not have an S suffix are quarter courses but the credits have been converted to semester values.

Histotechnology

Major: Histotechnology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 47.0
Classification of Instructional Programs (CIP) code: 51.1007
Standard Occupational Classification (SOC) code: 29-2011; 29-2012

About the Program

The Graduate School of Biomedical Sciences and Professional Studies offers the Master of Science in Histotechnology program. This one-year (12-month) program combines academic studies with a clinical practicum to prepare the students to perform complex tissue specimen preparations in the histology laboratory. The program provides advanced training and is designed to enable graduates to work as highly qualified histotechnologists under the supervision of pathologists.

Coursework includes histology, biochemistry, advanced histotechnology, anatomy, physiology, microbiology, medical ethics, laboratory management and leadership skills. In addition to the course work, students complete a three-month practicum designed to allow students to apply the knowledge and techniques learned during their didactic courses in a clinical hospital setting. The practicum allows the student the opportunity to perform routine as well as specialized, histotechnology techniques under the supervision of a qualified histotechnologist.

Program Accreditation

The *National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)* has established national standards for Histotechnologytraining programs.The standards include both didactic course work and clinical experiences necessary to properly educate a Histotechnologist. The Master of Histotechnology program at Drexel University College of Medicine is accredited by NAACLS. Visit the NAACLS (http://www.naacls.org) website for more information about the professional activities of this organization.

Professional Certification

The *American Society for Clinical Pathology Board of Certification* (ASCP BOC) has established a national certification program for Histotechnologists. Graduates of the Master of Histotechnology program are eligible to sit for the national certification examination for Histotechnology. Visit the ASCP BOC (http://www.ascp.org/Board-of-Certification) website to read more about the certification program and the professional activities of this organization.

Professional Affiliation

The *National Society for Histotechnology* (NSH) is a non-profit organization, committed to the advancement of Histotechnology, its practitioners and quality standards of practice through leadership, education and advocacy. Visit the NSH website to read more about the professional activities of this organization.

Career Opportunities

Histotechnologists are employed in community hospitals, academic centers such as medical schools and university hospitals, private pathology laboratories, medical research centers, government hospitals. Additional opportunities are available in clinical and industrial research, veterinary pathology, marine biology and forensic pathology.

For more information about this program, visit the College of Medicine's Master of Science in Histotechnology (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AlliedHealthProfessionPrograms/HistotechnologyProgram.aspx) page.

Admission Requirements

A bachelor's degree in a biological or allied health science, with a cumulative GPA of approximately 2.75, is the minimum requirement for acceptance into the Master's Degree Program. Prerequisite course work includes mathematics, English composition, general chemistry, organic and/or biochemistry and biological science. Microbiology, anatomy and histology are recommended but not required.
All candidates will be required to have a formal interview with one of the program director's prior to final acceptance. Deadline for submission of the application is the second Friday in June of the year in which the students plan to enroll.
Candidates for admission must provide the following credentials:

- Completed application form
- Resume
- Official Transcripts from all schools attended or where coursework was attempted or taken
- Official General Graduate Record Examination (GRE) scores
- Three letters of evaluation
- Self-assessment essays:

A. Discuss personal goals, conditions, or career aspirations that motivate you to pursue graduate study at Drexel University.
B. What are your most important accomplishments?
C. What do you expect to achieve through this program?

The application and supporting material must be received no later than the program deadline date.
For further information, contact:

Tina Rader, MHS, PA(ASCP)[CM]
Master of Histotechnology Program Co-Director
Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 N. 15th Street, Mail Stop 344
Philadelphia, PA 19102-1192
(215) 762-4113
tina.rader@drexelmed.edu

Degree Requirements

Required Courses

MFSP 551S	Human Function	3.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 553S	Human Structure Lab	1.0
MHPP 500S	Advanced Histotechnology	4.0
MHPP 502S	Histotechnology Capstone Project	3.0
MHPP 503S	Histotechnology Practicum	9.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 540S	Histotechnology I	3.0
MSPA 560S	Medical Ethics	2.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
Total Credits		**47.0**

Sample Plan of Study

First Year
Fall

		Credits
MLAS 545S	Fundamentals of Histology	3.0
MSPA 520S	Medical Terminology	3.0
MSPA 540S	Histotechnology I	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPP 511S	Concepts in Bioch Cell Biolo	4.0
	Term Credits	**16.0**

Spring

MFSP 551S	Human Function	3.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 553S	Human Structure Lab	1.0
MHPP 500S	Advanced Histotechnology	4.0
MHPP 502S	Histotechnology Capstone Project	3.0
MSPA 580S	Medical Microbiology I	4.0
	Term Credits	**18.0**

Summer

MHPP 503S	Histotechnology Practicum	9.0
MSPA 510S	Laboratory Management	2.0
MSPA 560S	Medical Ethics	2.0
	Term Credits	**13.0**

Total Credit: 47.0

Immunology

Major: Immunology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.0507
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The MS in Immunology is designed to prepare students for careers in basic discovery, translational, and clinical research pertaining to infectious and inflammatory disease and other immunologic problems pursued in government, industry and academic environments.
The focus of the program will be to train participants in various aspects of research related to immunology and inflammatory disease, in particular, research and development relevant to new immunodiagnostics, immunotherapeutics, and vaccines to prevent and/or treat infectious diseases such as HIV/AIDS, hepatitis, influenza, malaria, and other viral, bacterial, parasitic, and fungal pathogens.
Special attention will be given to the study of:

- immunutherapeutic and vaccine target identification;
- immune response mechanisms;
- immunomodulators and immune response modifiers;
- vaccine discovery and development;
- immunologic redundancy; and
- innate and adaptive immune escape mechanisms.

Expertise in animal model development and use, basic discovery, and biological containment laboratories will also be emphasized.

The MS in Immunology encompasses two years of required and elective courses and a comprehensive research internship completed during the two-year training program. The internship will encompass three specific areas of research:

- the basic discovery of innate and adaptive immune response mechanisms;
- the translational research centered in therapeutic and prevention vaccine development or the development of immunomodulatory strategies; and
- the clinical immunology research arena.

The program is designed for applicants from a number of different academic and career backgrounds, allowing for flexibility for incoming students at a variety of levels. Most course work is offered in the late-afternoon or evenings. In addition to the standard pathway, students may complete their degree requirements in a more compact time frame, or they may select a part-time pathway to permit the simultaneous pursuit of other activities.

Admission Requirements

For acceptance into the Master of Science in Immunology program, the applicant must have completed a four-year biology or chemistry-based BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

#Official transcripts from all colleges and universities attended

#A current Curriculum Vitae (C.V.) or resume

#References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research and professional experience.

{C}{C}{C}For additional information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/ducom) site.

Admission Requirements

For acceptance into the Master of Science in Immunology program, the applicant must have completed a four-year biology or chemistry-based BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- Official transcripts from all colleges and universities attended
- A current *curriculum vitae* (CV) or resume
- References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research and professional experience.

For additional information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/ducom/immunology) site.

Degree Requirements

Courses encompass the fundamental requirements to establish a solid grounding in microbiology and infectious disease, immunology, biochemistry, genetics, and molecular biology.

Research experiences will form a large component of the training program, with the possibility of completing the degree with or without a thesis document.

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fund. Mol. Med. III	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 534S	Fund. Molecular Med. VI	1.0
MIIM 606S	Micro & Immuno Seminar	1.0
MIIM 546S	Introduction to Immunology	2.0
MIIM 651S	Research Internship in Immunology	6.0
MIIM 654S	Clinical Correlations in Immunology	3.0
To complete the MS in Immunology degree, 36.0 credits must be accrued. Students may choose from a menu of additional electives, depending on their academic goals.		8.0

Possible Electives

MIIM 502S	Micro & Immuno. Journal Club	
MIIM 521S	Biotechniques I	
MIIM 522S	Biotechniques II	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 526S	Animal Models in Biotechnology	
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	

MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 607S	IMMUNOLOGY II	
MIIM 612S	MOLEC MECH OF VIRAL PATHOGENSI	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	
MIIM 613S	Emerging Infectious Diseases	
Total Credits		**36.0**

Infectious Disease

Major: Infectious Disease
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.0508
Standard Occupational Classification (SOC) code: 19-1022; 19-1029

About the Program

The Master of Science in Infectious Disease program provides graduate-level training in various aspects of basic, translational, and clinical research related to infectious disease. Emphasis is placed on research and development efforts focused on new diagnostics, therapeutics, and vaccines used to prevent and/or treat infectious diseases such as HIV/AIDS, hepatitis, influenza, malaria, and other diseases caused by viral, bacterial, parasitic, and fungal pathogens.

Special attention is given to the study of therapeutic and vaccine target identification, the discovery and development of drugs and vaccines, and a greater understanding of resistance and immune escape mechanisms that reduce treatment effectiveness.

The program includes two years of required and elective graduate courses as well as a comprehensive research internship to be completed during the course of the training program. The internship encompasses one of three specific areas of research in the field of infectious disease:

- basic discovery involving infectious bacterial, viral, fungal, or parasitic pathogens that cause human disease;
- translational research focused on the development of new approaches to diagnose, prevent, or treat infectious diseases; and
- clinical infectious disease research.

Elective courses available to students in the program provide knowledge and expertise in areas relevant to infectious disease research, such as animal model use in biotechnology, emerging infectious diseases, vaccines and vaccine development, biotechniques and laboratory research, and principles of biocontainment.

The program is designed to prepare students for careers in infectious disease in government, industry, and academic environments. The program is ideally suited for enhancing the scientific credentials of recent college graduates, early career scientists, premedical students, industrial employees, and clinical laboratory technicians.

Although most students will complete the program in two years, some may opt to enroll on a part-time basis, taking up to four years to complete the degree program. While the program can be completed without a dissertation, a thesis option is available. Most courses are offered during the late afternoon or early evening to accommodate students who may

be employed during the day in the biotechnology, pharmaceutical, and biomedical arenas. Most courses are offered both live and online, providing the student the flexibility to enroll in one or the other.

Admission Requirements

For acceptance into the Master of Science in Infectious Disease program, the applicant must have completed a four-year biology or chemistry-related BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- Official transcripts from all colleges and universities attended
- A current *curriculum vitae* (cv) or resume
- References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research or professional experiences.

Visit the Master of Science in Infectious Disease (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/InfectiousDisease.aspx) program website for more detailed information. For additional information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/ducom/infectious-diseases) site.

Degree Requirements

Required Courses

IDPT 501S	Biostatistics I	2.0
IDPT 500S	Responsible Conduct of Research	2.0
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	2.0-3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fund. Mol. Med. III	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 545S	Introduction to Infectious Diseases	5.0
MIIM 534S	Fund. Molecular Med. VI	1.0

MIIM 606S	Micro & Immuno Seminar	1.0
MIIM 652S	Research Internship in Infectious Diseases	6.0
MIIM 653S	Clinical Correlations in Infectious Disease	3.0
Electives		6.0-15.0
MIIM 521S	Biotechniques I	
MIIM 522S	Biotechniques II	
MIIM 523S	Molecular Virology	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 526S	Animal Models in Biotechnology	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 621S	Biotechniques and Laboratory Research I	
MIIM 622S	Biotechniques and Laboratory Research II	
Total Credits		**36.0-46.0**

Interdisciplinary Health Sciences

Major: Interdisciplinary Health Sciences
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 51.1099
Standard Occupational Classification (SOC) code: 29-2011; 29-2012

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Science degree in Interdisciplinary Health Sciences. Students matriculating in this program or those already participating in Master of Science in Biological Science (p. 79) or Drexel Pathway to Medical School (p. 84) (DPMS) Master's programs who qualify (see admissions guidelines (http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/InterdisciplinaryHealthSciences.aspx)) and wish to obtain additional, more focused education within the medically related health sciences can earn a Master of Science degree through this program. Having obtained a broad exposure to a variety of health care and medically related sciences during the first year, the second year will permit students to refine their knowledge and further explore closely related subjects in a chosen area of focus in greater depth.

In their second year, students in the IHS program complete a research project and elect coursework primarily from a declared area of specialization in the biomedical sciences. The program's advanced educational experience confers a unique training and perspective that is well-suited to understanding the numerous complexities and professional interrelationships of the current health care system. Upon completion, students will have a strong, integrated view of the medical sciences—providing numerous advantages to graduates, whether utilizing the degree as a springboard for further professional education or subsequently entering the healthcare workforce.

During their participation in the second year of the program, students will complete a minimum of 24.0 additional credit hours of graduate course work (for a total minimum of 48 hours in entire 2 year program) including a final research project and paper. The Master of Science (MS) will be awarded contingent upon satisfactory completion of all program requirements, including an earned GPA of no less than 3.0.

For more information about the program, visit the College of Medicine's MS in Interdisciplinary Health Sciences (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/MasterofScienceInterdisciplinaryHealthScience.aspx) page.

Admission Requirements

There are two routes of entry into the Master of Interdisciplinary Health Sciences (IHS) program. US citizens or permanent residents either directly matriculate into the program or may transition into the program from other qualifying programs, such as the Master of Science in Biological Science (p. 70) program. International students are required to enter the Master of Interdisciplinary Health Sciences program directly.

In their second year of the program, students will be required to declare a concentration track. See the College's curriculum (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/MasterofScienceInterdisciplinaryHealthScience.aspx) page for more details about the concentrations.

For more information about applying to the program, visit the College of Medicine's MS in Interdisciplinary Health Science Admissions (http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/InterdisciplinaryHealthSciences.aspx) page.

Fall

Required Courses		
IHS 500S	Career Counseling in the Health Sciences Seminar I	1.0
Working with an advisor, students select four courses from the following:		11.0
CR 505S	Ethical Issues in Research	
CR 515S	Intro to Clinical Trials	
CR 525S	Scientific Wriring and Medical Literature	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 545S	Pharmaceutical Law	
CR 550S	Leadership Skills	
CR 612S	Fundamentals of Compliance	
CR 617S	Informatics in Pharm Res & Development	
MLAS 523S	Organizational Management	
MLAS 525S	Animal Anatomy	
MLAS 531S	Embryology	
MLAS 536S	Animal Models for Biomedical Research	
MLAS 545S	Fundamentals of Histology	
MSPA 540S	Histotechnology I	
MSPA 580S	Medical Microbiology I	
MLAS 531S	Embryology	
PHRM 512S	Graduate Pharmacology	

MSPP 511S	Concepts in Bioch & Cell Biolo	
Spring		
Required Courses		
IHS 501S	Career Counseling in the Health Sciences Seminar II	1.0
IHS 502S	Neuropharmacology	3.0
MSPP 525S	Community Dimensions of Medici	2.0
Working with an advisor, students select two additional courses from the following:		6.0
PBHL 530	Principles of Epidemiology	
MLAS 535S	Biology & Care Of Lab Animals	
MSPA 581S	Medical Microbiology II	
MSPP 513S	Special Topics in Anatomy	
MSPP 515S	Biological Function & Regulation	
CR 545S	Pharmaceutical Law	
Total Credits		**24.0**

Core Required Courses

IHS 500S	Career Counseling in the Health Sciences Seminar I	1.0
IHS 513S	Introduction to Scientific Writing	3.0
IHS 501S	Career Counseling in the Health Sciences Seminar II	1.0
IHS 502S	Neuropharmacology	3.0
IHS 507S	Initiating Biomedical Research	2.0
IHS 508S	MIHS Research Project	1.5
IHS 509S	MIHS Research Paper	1.5
MSPP 525S	Community Dimensions of Medici	2.0
CR 999S	Special Topics (Intro to Biostatistics)	3.0
Total Credits		**18.0**

Elective Courses

Clinical Research, Management and Laboratory Skills		18.0
Select six from the following:		
CR 614S	Pharmacotherapy in New Drug R&D	3.0
MLAS 523S	Organizational Management	3.0
MSPA 520S	Medical Terminology	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MLAS 535S	Biology & Care Of Lab Animals	4.0
CR 535S	Current Federal Regulatory Issues in Biomedical Research	3.0
CR 999S	Special Topics (Clinical Data Management)	1.0-3.0
CR 600S	Designing the Clinical Trial	3.0
CR 612S	Fundamentals of Compliance	3.0
CR 505S	Ethical Issues in Research	3.0
MFSP 589S	Forensic DNA Analysis	3.0
IHS 506S	Healthcare in Spanish II	3.0
Total Credits		**54.0-56**

Biochemical and Pharmacologic Principles		18.0
Select six of the following:		
CR 614S	Pharmacotherapy in New Drug R&D	3.0

MLAS 520S	Financial Mgmt In Lab Anim Sci	3.0
MFSP 557S	Drug Chemistry	2.0
MFSP 589S	Forensic DNA Analysis	3.0
CR 545S	Pharmaceutical Law	3.0
MFSP 551S	Human Function	3.0
IHS 511S	Biology of Cancer	3.0
MSPP 515S	Biological Function & Regulation	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 525S	Drug Discovery and Development I	3.0
IHS 999S	Special Topics (Molecular Biology and Biochemistry)	2.0-10.0
Total Credits		**50.0-58.0**

Concepts in Anatomy and Pathology		18.0
Select six of the following:		
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MLAS 529S	Molecular Genetics	3.0
MLAS 525S	Animal Anatomy	2.0
MFSP 581S	Human Osteology and Calcified Tissue Biology I	3.0
MFSP 582S	Human Osteology and Calcified Tissue Biology II	2.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	3.0
MFSP 588S	Special Topics in Cell Biology	2.0
MFSP 554S	Principles of Forensic Pathology	4.0
MFSP 999S	Special Topics (Human Structure with Lab)	4.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
IHS 511S	Biology of Cancer	3.0
Total Credits		**58.0**

Laboratory Techniques		18.0
Select six of the following:		
CR 505S	Ethical Issues in Research	3.0
CR 609S	Innovative Product Development	3.0
MFSP 589S	Forensic DNA Analysis	3.0
MFSP 577S	Genetics for the Forensic Scientist	2.0
MFSP 578S	Forensic Photography	3.0
MFSP 579S	Forensic Microbiology	2.0
MFSP 580S	Principles of Immunology	2.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MLAS 535S	Biology & Care Of Lab Animals	4.0
MLAS 545S	Fundamentals of Histology	3.0
IHS 514S	Molecular Biology & Biochemistry of the Cell	3.0
Total Credits		**47.0**

Medical Science		
Required Courses for this Concentration		
IMSP 512S	Medical Biochemistry	8.0
IMSP 520S	Medical Physiology I	3.5
IMSP 521S	Medical Physiology II	3.5
IMSP 540S	Cell Biology & Microanatomy I	5.0
IMSP 541S	Cell Biology and Microanatomy II	3.0

IMSP 502S	Medicine and Society I	3.0
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 560S	Medical Neuroscience	6.0
IMSP 571S	Medical Nutrition I	
IMSP 572S	Medical Nutrition II	
IMSP 573S	Medical Immunology I	
IMSP 574S	Medical Immunology II	
Total Credits		**34.0**

Medical Science

Major: Medical Science
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 57.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The Master of Science in Medical Science (MMS) program offers students whose record necessitates a second year of study, the opportunity to earn the Master of Science degree in order to successfully compete as medical school applicants. The MMS curriculum permits students to take additional medical school and other graduate coursework while completing an extensive research project, thus further strengthening their academic backgrounds while gaining a competency highly valued by the vast majority of US medical school admission committees.

The MMS program serves some of our brightest students (as demonstrated by high MCAT scores and other aspects of their previous records) who nevertheless need two years of study in order to gain acceptance to medical school. In addition, it also serves as a destination for some students who begin the one year Interdepartmental Medical Science MS degree program, but opt to transfer into a more comprehensive and highly rigorous program.

Additional Information

Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 North 15th Street, Mail Stop 344, Room 4104 NCB
Philadelphia, PA 19102
215.762.4692
medicalsciences@drexelmed.edu

Degree Requirements

To fulfill requirements for the MS in Medical Science, students conduct either bench-top or clinical research with a Primary Investigator. Students who have a 3.00 or higher GPA may take one second-year medical school course and students whose GPA falls below a 3.00 are required to take 6 credits of graduate level biological science coursework. After successful completion of the program, the student is awarded a Master of Science degree.

Required Core Courses

IMSP 502S	Medicine and Society I	3.0
IMSP 506S	Medical Professionalism and Leadership	2.0
IMSP 512S	Medical Biochemistry	8.0
IMSP 520S	Medical Physiology I	3.5
IMSP 521S	Medical Physiology II	3.5
IMSP 540S	Cell Biology & Microanatomy I	5.0
IMSP 541S	Cell Biology and Microanatomy II	3.0
IMSP 560S	Medical Neuroscience	6.0
MMSP 501S	Research in Medical Science I	6.0
MMSP 503S	Research Seminar I	1.0
A minimum of 10.0 credits in the following courses is required with the approval of the program director.		10.0
CR 520S	Applications of Clinical Research Biostatistics	
MLAS 530S	Biostats In Vet Science	
MMSP 502S	Research in Medical Science II	
MMSP 504S	Research Seminar II	
Graduate Level Elective Credits		**6.0**
CR 505S	Ethical Issues in Research	
CR 515S	Intro to Clinical Trials	
CR 525S	Scientific Wriring and Medical Literature	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 565S	Contemporary Issues in Human Research Protection	
CR 600S	Designing the Clinical Trial	
CR 609S	Innovative Product Development	
CR 612S	Fundamentals of Compliance	
CR 614S	Pharmacotherapy in New Drug R&D	
CR 617S	Informatics in Pharm Res & Development	
IHS 505S	Healthcare in Spanish I	
IHS 506S	Healthcare in Spanish II	
IHS 511S	Biology of Cancer	
IMSP 571S	Medical Nutrition I	
IMSP 572S	Medical Nutrition II	
IMSP 573S	Medical Immunology I	
IMSP 574S	Medical Immunology II	
MFSP 581S	Human Osteology and Calcified Tissue Biology I	
MFSP 582S	Human Osteology and Calcified Tissue Biology II	
MFSP 583S	The Autopsy in Clinical Forensic Medicine	
MFSP 584S	Introduction to Forensic Radiology	
MFSP 585S	Clinical Forensic Emergency Medicine and Traumatology	
MFSP 586S	Introduction to Forensic Pediatrics	
MFSP 589S	Forensic DNA Analysis	
MLAS 523S	Organizational Management	
MLAS 529S	Molecular Genetics	
MLAS 531S	Embryology	
MMSP 520S	Medical Pathology I	
MMSP 521S	Medical Pathology II	
MSPA 580S	Medical Microbiology I	
MSPA 581S	Medical Microbiology II	
MSPP 513S	Special Topics in Anatomy	
PHRM 512S	Graduate Pharmacology	
Total Credits		**57.0**

Pathologists' Assistant

Major: Pathologists' Assistant
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 91.0
Classification of Instructional Programs (CIP) code: 51.0811
Standard Occupational Classification (SOC) code: 29-2055

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Science in Pathologists' Assistant (PathA). The pathologists' assistant is an intensely trained allied health professional who provides anatomic pathology services under the direction and supervision of a pathologist. Pathologists' assistants interact with pathologists in the same manner that physicians' assistants carry out their duties under the direction of physicians in surgical and medical practice.

The PathA program offers students the opportunity to train in the highly specialized field of anatomic pathology. This two-year, full-time program begins in May of each year. The first year is comprised of the instructional portion of the program supplemented by pathology laboratory exposure. The second year of the program is composed of several hospital-based clinical rotations offering progressively responsible experience in autopsy and surgical pathology. These rotations are supplemented with informal classroom education.

Program Accreditation

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS): NAACLS, in conjunction with the AAPA, has established national standards for Pathologists' Assistant training programs. The standards include both didactic course work and clinical experiences necessary to properly educate a pathologists' assistant. The Master of Pathologists' Assistant program at the Drexel University College of Medicine is accredited by NAACLS. Visit the NAACLS (http://www.naacls.org) website for more information about the professional activities of this organization.

Professional Certification

The American Society for Clinical Pathology Board of Registry (ASCP BOC): The ASCP BOC, in conjunction with the AAPA, has established a national certification program for Pathologists' Assistants. In 2005, the ASCP BOC first offered a national certification examination for Pathologists' Assistants. In order to be eligible for the BOC examination, applicants must be graduates of a pathologists' assistant educational program accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). Visit the ASCP BOC (http://www.ascp.org/Board-of-Certification) website to read more about the certification program and the professional activities of this organization.

Professional Affiliation

The American Association of Pathologists' Assistants (AAPA): The AAPA is the only national professional organization for pathologists' assistants.

The AAPA:

- is a not-for-profit, volunteer organization dedicated to advancing the pathologists' assistant profession by providing its members with education, networking, and professional support;
- supports professional competency through program accreditation and individual certification;
- promotes public and professional awareness of the pathologist's assistant as an integral member of the healthcare team.

Visit the AAPA (http://www.pathassist.org) website for more additional information about this association.

Career Opportunities

Pathologists' assistants are employed in community hospitals, academic centers such as medical schools and university hospitals, private pathology laboratories, medical research centers, government hospitals and medical examiner offices.

For more information about this program, visit the College of Medicine's Master of Science in Pathologists' Assistant (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AlliedHealthProfessionPrograms/PathologistsAssistantPathAProgram.aspx) program's web page.

Admission Requirements

A pathologist's assistant is someone who has the ability to relate to people, the capacity for calm and reasoned judgment and who demonstrates a commitment to quality patient care.
The program's courses and content are ideal for:

- Recent graduates with a degree in a biological or allied health science, with exposure to anatomy, physiology, chemistry and microbiology. Previous exposure to pathology is recommended.
- Allied health professionals, in particular cytotechnologists, histotechnologists and medical technologists.

Admission requirements

Students will be selected on the basis of adequate educational background and medical experience. A bachelor's degree in a biological or allied health science with a cumulative GPA of at least 3.0 is the minimum requirement for acceptance into the program. Prerequisite course work will include microbiology, human anatomy, physiology, mathematics, English composition, general chemistry, organic and/or biochemistry and biological science.

All candidates will be required to have a formal interview with the Selection Committee prior to final acceptance. Deadline for submission of the application is the second Friday in February of the year in which the students plan to enroll.
Candidates for admission must provide the following credentials:

- Completed application form
- Resume
- Official transcripts from all college or university attended or where coursework was attempted or taken
- Official General Graduate Record Examination (GRE) scores
- Three letters of evaluation
- Self-assessment essays:
  A. Discuss personal goals, conditions, or career aspirations that motivate you to pursue graduate study at Drexel University.

  B. What are your most important accomplishments?

  C. What do you expect to achieve through this program?

For further information, contact:

Tina Rader, MHS, PA (ASCP)
Program Co-Director
Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 N. 15th Street, Mail Stop 344
Philadelphia, PA 19102-1192
215-762-4692
tina.rader@drexelmed.edu

Degree Requirements

Required Courses

MFSP 551S	Human Function	3.0
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 500S	Gross Anatomy	5.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 530S	Biomedical Photography	4.0
MSPA 540S	Histotechnology I	3.0
MSPA 541S	Histotechnology II	3.0
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 560S	Medical Ethics	2.0
MSPA 570S	Medical Pathology I	6.0
MSPA 571S	Medical Pathology II	4.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 581S	Medical Microbiology II	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPA 600S	Surgical Pathology I	6.0
MSPA 601S	Surgical Pathology II	6.0
MSPA 602S	Surgical Pathology III	6.0
MSPA 610S	Autopsy Pathology I	6.0
MSPA 611S	Autopsy Pathology II	6.0
MSPA 612S	Autopsy Pathology III	6.0
Total Credits		**91.0**

Plan of Study

First Year

Term 1

		Credits
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 500S	Gross Anatomy	5.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
	Term Credits	**16.0**

Term 2

MSPA 530S	Biomedical Photography	4.0
MSPA 540S	Histotechnology I	3.0
MSPA 570S	Medical Pathology I	6.0
MSPA 580S	Medical Microbiology I	4.0

MSPA 590S	Leadership Skills for the Medical Profession	3.0
	Term Credits	**20.0**

Term 3

MFSP 551S	Human Function	3.0
MSPA 541S	Histotechnology II	3.0
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 571S	Medical Pathology II	4.0
MSPA 581S	Medical Microbiology II	3.0
	Term Credits	**17.0**

Second Year

Term 4

MSPA 560S	Medical Ethics	2.0
MSPA 600S	Surgical Pathology I	6.0
MSPA 610S	Autopsy Pathology I	6.0
	Term Credits	**14.0**

Term 5

MSPA 601S	Surgical Pathology II	6.0
MSPA 611S	Autopsy Pathology II	6.0
	Term Credits	**12.0**

Term 6

MSPA 602S	Surgical Pathology III	6.0
MSPA 612S	Autopsy Pathology III	6.0
	Term Credits	**12.0**

Total Credit: 91.0

Required Courses

MFSP 551S	Human Function	3.0
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 500S	Gross Anatomy	5.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 530S	Biomedical Photography	4.0
MSPA 540S	Histotechnology I	3.0
MSPA 541S	Histotechnology II	3.0
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 560S	Medical Ethics	2.0
MSPA 570S	Medical Pathology I	6.0
MSPA 571S	Medical Pathology II	4.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 581S	Medical Microbiology II	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPA 600S	Surgical Pathology I	6.0
MSPA 601S	Surgical Pathology II	6.0
MSPA 602S	Surgical Pathology III	6.0
MSPA 610S	Autopsy Pathology I	6.0
MSPA 611S	Autopsy Pathology II	6.0
MSPA 612S	Autopsy Pathology III	6.0
Total Credits		**91.0**

Microbiology and Immunology

Major: Microbiology and Immunology
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 36.0-48.0 (MS); 96.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0599
Standard Occupational Classification (SOC) code: 19-1022

About the Program

The Department of Microbiology and Immunology offers students the MS and PhD degrees. The programs are designed to promote understanding of the molecular mechanisms of infectious diseases. The department has research programs in the areas of parasitic, viral, and opportunistic infections; bacterial pathogenesis and genomics; immunology; and drug development driven by investigators with national and international reputations and with extended histories of extramural funding from the NIH, as well as other sources of funding.

In the first year, students complete both required courses in the core curriculum, and research laboratory rotation requirements. All students must pass an examination at the end of the first year, while also attending seminars and journal clubs.

MS in Microbiology and Immunology

MS students are required to successfully complete the core curriculum and the first year program-specific course work (Molecular Pathogenesis I and II and Immunology). The preliminary examination, taken at the end of the first year, involves a proposal describing the research to be undertaken towards completion of the MS degree. In all semesters, MS students must attend seminars and journal clubs.

PhD in Microbiology and Immunology

PhD students are required to successfully complete the core curriculum and the first year program-specific course work (Molecular Pathogenesis I and II and Immunology). The preliminary examination, taken at the end of the first year, involves a research proposal written in response to a question submitted by a committee of the Program's faculty. Advanced level courses in immunology, virology, advanced molecular biology, microbial pathogenesis, experimental therapeutics and emerging infectious diseases are offered to interested students in the second year and PhD students are required to enroll for credit for at least two advanced courses.

PhD candidates must pass a qualifying examination in the middle of their third year. In all semesters, PhD students must attend seminars and journal clubs. PhD students are also required to submit a minimum of two manuscripts (publications from their research) during the course of the program. The average amount of time required to complete the PhD requirements is five years.

Courses Repeatable for Credit
As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information, including scheduling a plan of study, visit the College of Medicine's Microbiology and Immunology Program (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MicrobiologyImmunology.aspx) website.

MS Degree Requirements: Non-Thesis Option

MS without thesis: 36.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MIIM 502S	Micro & Immuno. Journal Club	1.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	MOLECULAR PATHOGENSIS II	3.0
MIIM 606S	Micro & Immuno Seminar	1.0

Suggested Electives *

Select three of the following:		9.0
MIIM 504S	Micro. & Immuno. 1st Rotation	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
MIIM 607S	IMMUNOLOGY II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	

Total Credits	**38.0**

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

MS Degree Requirements: Thesis Option

MS with thesis: 48.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MIIM 502S	Micro & Immuno. Journal Club	1.0
MIIM 504S	Micro. & Immuno. 1st Rotation	4.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	MOLECULAR PATHOGENSIS II	3.0
MIIM 600S	Micro.&Immuno Thesis Research	9.0
MIIM 606S	Micro & Immuno Seminar	1.0

Suggested Electives *

MIIM 505S	Micro. & Immuno. 2nd Rotation	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
MIIM 607S	IMMUNOLOGY II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	
Total Credits		**47.0**

* No electives are required for the MS with Thesis option. This list includes suggested electives, however additional courses from the Biograduate Medical programs may also be taken. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

PhD Degree Requirements

PhD: 96.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MIIM 502S	Micro & Immuno. Journal Club	1.0
MIIM 504S	Micro. & Immuno. 1st Rotation	4.0
MIIM 505S	Micro. & Immuno. 2nd Rotation	4.0
MIIM 506S	Micro. & Immuno. 3rd Rotation	4.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	MOLECULAR PATHOGENSIS II	3.0
MIIM 600S	Micro.&Immuno Thesis Research	9.0
MIIM 606S	Micro & Immuno Seminar	1.0
Suggested Electives *		6.0

Select two of the following:

MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
MIIM 607S	IMMUNOLOGY II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	
Total Credits		**61.0**

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

Molecular Medicine

Major: Molecular Medicine
Degree Awarded: Master of Science (MS)

Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.0204
Standard Occupational Classification (SOC) code: 19-1029

About the Program

The Master of Science in Molecular Medicine program provides training in the academic, research and entrepreneurial aspects of the biomedical sciences with an emphasis on translational research in the development of therapeutics and vaccines. This flexible program, offered in the early evening, has been designed to both enhance the academic credentials of individuals currently employed in industrial or educational pursuits, and to offer an opportunity for an *entré* degree for individuals interested in following a career in the biomedical industrial sciences.

The Master of Science in Molecular Medicine program is designed to provide academic and practical biotechnological knowledge in translational research, particularly in the areas of molecular therapeutics and vaccine development.

The program is ideally suited for enhancing the scientific credentials of the following target groups:

- industrial employees
- high school biology teachers
- new college graduates
- college undergraduates
- pre-medical students

The degree encompasses the fundamental requirements to establish a sound grounding in microbiology, biochemistry, genetics, and molecular biology. The program is designed with two years of required and elective graduate courses, and a research internship in the summer session of the first or second year. The flexibility of the curriculum enables students to complete the degree requirement within 18 months on a full-time basis, and up to 4 years on a part-time basis. The successful completion of the degree will be determined by grades obtained in the graduate courses, participation in seminars and journal clubs, and performance in the research component.

The research component of the curriculum can be fulfilled by two alternative approaches: (1) a research internship in which a 12 week research program will be undertaken in the summer session of either the first or second year of the program; or (2) as a combination of a 6 week research rotation in the laboratory of a participating faculty member in combination with the taking of one or more elective courses which focus on state-of-the-art biotechniques. A thesis is not required.

Classes can be attended at any of three Drexel College of Medicine locations: Center City and Queen Lane campuses in Philadelphia, and the Pennsylvania Biotechnology Center in nearby Doylestown. State-of-the-art video conferencing provides real-time interactive learning at all three locations.

Admission Requirements

For acceptance into the Master of Science in Molecular Medicine program, the applicant must have completed a four-year biology or chemistry-based BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly

desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- Official transcripts from all colleges and universities attended
- A current *curriculum vitae* (CV) or resume
- References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research or professional experiences.

For additional information about the program, view the MS in Molecular Medicine (http://www.drexelmed.edu/Home/AcademicPrograms/ BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/ MolecularMedicine.aspx) page on the College of Medicine's website.

Degree Requirements

About the Curriculum

Through the combination of required and elective courses, a total of 36.0 credits is required to successfully obtain the degree of Masters of Science in Molecular Medicine. In order to maintain full-time student status, a minimum of 9.0 credits must be taken in any given academic semester. Students should work with their program advisors to plan their course of study.

Research Requirements

The research component can be fulfilled by two approaches: (1) a research internship in which a 12-week research program will be undertaken in the summer session of either the first or second year of the program. (The internship can be undertaken in a laboratory of a participating faculty member, or in a laboratory of one of the Industrial Partners when necessary research training plans of longer duration and depth can be developed with the approval of the Program Advisory Committee); or (2) as a combination of a 6-week research rotation in the laboratory of a participating faculty member in combination with the taking of one or more elective courses which focus on state-of-the-art biotechniques.

For a plan of study listing the sequence of how courses should be completed, students should work with their program advisor.

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0

MIIM 540S	Viruses and Viral Infections	2.0
MIIM 541S	Bacteria and Bacterial Infections	2.0
MIIM 542S	Mycology, Fungal Infections and Antibiotics	2.0
MIIM 543S	Parasitology and Parasitic Diseases	2.0
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	2.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fund. Mol. Med. III	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 534S	Fund. Molecular Med. VI	1.0
MIIM 606S	Micro & Immuno Seminar	1.0

Electives

To complete the 36.0 credits total, students select from a menu of additional electives, and complete their required research component.		12.0
MIIM 521S	Biotechniques I	
MIIM 522S	Biotechniques II	
MIIM 523S	Molecular Virology	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 526S	Animal Models in Biotechnology	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 621S	Biotechniques and Laboratory Research I	
MIIM 622S	Biotechniques and Laboratory Research II	
MIIM 650S	Research Internship	

Total Credits	**36.0**

Molecular Pathobiology

Major: Molecular Pathobiology
Degree Awarded: Master of Science (MS); Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 36.0-48.0 (MS); 96.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0204
Standard Occupational Classification (SOC) code: 19-1029

Note: This program is currently not accepting students.

About the Programs

The Molecular Pathobiology program provides a thorough education in contemporary knowledge of pathophysiological mechanisms and prepares students for careers in research as well as teaching in academic and corporate institutions. Students entering without advanced standing should complete the MS program in two to three years and the PhD program in four to five years.

The program has a large faculty, drawn from many basic science and clinical departments within the University. Active research programs involve HIV neuropathology, cancer biology and therapeutics, inhibition of tumor angiogenesis, ulcerative colitis, pathophysiology of apoptosis, tissue engineering, transplant immunology, and diseases of the cardiovascular, respiratory, biliary, and gastrointestinal systems.

Funding for these programs provides an opportunity for research training in such diverse areas as the cellular and molecular biology of cancer; tumor immunology and virology; molecular genetics; neurobiology; pathophysiology of cardiovascular, biliary, and gastrointestinal diseases; and contemporary advances in epithelial ion transport, signal transduction, tissue engineering, and apoptosis.

To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's Biomedical Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx) website.

About the Curriculum

Background courses in biochemistry, molecular and cell biology, and integrative biology are taken during the first academic year. In addition, every student carries out short research projects in three different laboratories chosen by the student. This exposure to research not only gives the student broad research training, but also helps the student to select a thesis advisor at the end of the first academic year. In the second year, the student begins thesis research and takes several advanced courses, tailored to the student's individual interests.

Courses Repeatable for Credit
As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information, including a scheduling a plan of study, visit the College of Medicine's Molecular Pathobiology Program (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MolecularPathobiology.aspx) website.

MS Degree Requirements: Thesis Option

MS with thesis: 48.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PATH 502S	PATHOLOGY 1ST LAB ROTATION	4.0
PATH 503S	Pathology Journal Club	1.0
PATH 509S	Pathologic Processes	3.0
PATH 600S	Pathology Thesis Research	9.0
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	4.0

Suggested Electives *

Select at least one of the following:		4.0
ANAT 602S	MEDICAL NEUROSCIENCE	
BIOC 510S	Cancer Biology	
MIIM 500S	MEDICAL MICROBIOLOGY	
NEUR 508S	Graduate Neuroscience I	
NEUR 607S	INTEGRATED NEUROSCIENCE	
PATH 505S	PATHOLOGY 2ND LAB ROTATION	
PATH 506S	PATHOLOGY 3RD LAB ROTATION	

PHGY 503S	GRADUATE PHYSIOLOGY	
Total Credits		**48.0**

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) program.

MS Degree Requirements: Non-Thesis Option

MS without thesis: 39.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
PATH 503S	Pathology Journal Club	1.0
PATH 509S	Pathologic Processes	3.0
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	4.0

Suggested Electives *   10.0

Select three of the following:		
ANAT 602S	MEDICAL NEUROSCIENCE	
BIOC 510S	Cancer Biology	
MIIM 500S	MEDICAL MICROBIOLOGY	
NEUR 508S	Graduate Neuroscience I	
NEUR 607S	INTEGRATED NEUROSCIENCE	
PATH 502S	PATHOLOGY 1ST LAB ROTATION	
PATH 505S	PATHOLOGY 2ND LAB ROTATION	
PATH 506S	PATHOLOGY 3RD LAB ROTATION	
PHGY 503S	GRADUATE PHYSIOLOGY	

Total Credits		**36.0**

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

PhD Degree Requirements

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

96.0 semester credits

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final

stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PATH 502S	PATHOLOGY 1ST LAB ROTATION	4.0
PATH 503S	Pathology Journal Club	1.0
PATH 505S	PATHOLOGY 2ND LAB ROTATION	4.0
PATH 506S	PATHOLOGY 3RD LAB ROTATION	4.0
PATH 509S	Pathologic Processes	3.0
PATH 600S	Pathology Thesis Research	9.0
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	4.0
Suggested Electives [*]		
Select a minimum of two courses from the following:		44.0
ANAT 602S	MEDICAL NEUROSCIENCE	
BIOC 510S	Cancer Biology	
MIIM 500S	MEDICAL MICROBIOLOGY	
NEUR 508S	Graduate Neuroscience I	
NEUR 607S	INTEGRATED NEUROSCIENCE	
PHGY 503S	GRADUATE PHYSIOLOGY	
Total Credits		**96.0**

[*]   Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) program.

Molecular and Cell Biology and Genetics

Major: Molecular and Cell Biology and Genetics
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 36.0-48.0 (MS) or 96.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0910
Standard Occupational Classification (SOC) code: 19-1029

About the Program

The interdisciplinary, research-oriented Molecular and Cell Biology and Genetics program offers both MS and PhD degrees. Its strength is derived from the combined research expertise of the faculty in various departments, including Neurobiology and Anatomy, Biochemistry and Molecular biology, Microbiology and Immunology, Medicine, Pathology, and Pharmacology and Physiology. Faculty members conduct research on a broad array of topics, including cell, molecular, and cancer biology as well as genetics, infectious diseases and immunology.

About the MS Program

In the MS program, the focus is on strengthening the student's grasp of molecular biology and biotechnology and on providing a knowledge of research methods available in this fast-expanding field.

About the PhD Program

This program is research focused, with the ultimate goal of training students to become leaders of scientific research in academics and industry. In addition to completing the curriculum requirements, PhD students must pass a qualifying exam at the end of their second year.

Additional Information

For more information about the program, contact:

Caitlin Kaltenbach
Academic Coordinator
Biomedical Graduate and Postgraduate Studies
Drexel University College of Medicine
2900 Queen Lane Suite G24
Philadelphia, PA 19129-1096
215.991.8146
caitlin.kaltenbach@drexelmed.edu

Admission Requirements

Drexel University College of Medicine has a rolling admissions policy, which means that complete applications are reviewed as they are received. Applicants are therefore advised to apply early, as decisions to accept or deny admission may be made before the official deadlines.

To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's Biomedical Studies Admissions (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx) website.

About the Curriculum

Background courses in biochemistry, molecular and cell biology, and integrative biology are taken during the first academic year. In addition, every student carries out short research projects in three different laboratories during the first year. This exposure to research not only gives the student broad research training, but also helps the student to select a thesis advisor at the end of the first academic year. In the second year, the student begins thesis research and takes several advanced courses, tailored to the student's individual interests.

The program offers a weekly seminar series with invited external and intramural speakers who address the program's broad research interests. Journal Club members meet weekly in their own informal setting to present results of interest from the current literature.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information, including scheduling a plan of study, visit the College of Medicine's Molecular and Cell Biology and Genetics Program (http://www.drexelmed.edu/Home/AcademicPrograms/

BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MolecularCellBiologyGenetics.aspx) website.

MS Degree Requirements: Thesis Option

48.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 600S	Thesis Defense	9.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 512S	MCBG Journal Club	1.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
MCBG 600S	MCBG Thesis Research	9.0
Advanced Electives		6.0
In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 2 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.		
Total Credits		**48.0**

MS Degree Requirements: Non-Thesis Option

36.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 502S	MCBG 2nd Lab Rotation	4.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 512S	MCBG Journal Club	1.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
Advanced Electives		4.0
In consultation with the Advisory Committee and according to the area of selected research, the student may replace laboratory rotations with advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.		
Total Credits		**36.0**

PhD Degree Requirements

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

96.0 semester hours

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 502S	MCBG 2nd Lab Rotation	4.0
MCBG 503S	MCBG 3rd Lab Rotation	4.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 512S	MCBG Journal Club	1.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
MCBG 600S	MCBG Thesis Research	9.0
Advanced Electives		
In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 3 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.		
Total Credits		**50.0**

Neuroscience

Major: Neuroscience
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 36.0 - 48.0 (MS); 96.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.1501
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The College of Medicine School of Biomedical Sciences and Professional Studies offers an interdepartmental and multidisciplinary graduate program in Neuroscience leading to MS and PhD degrees. The program provides a vibrant research component for both MS and PhD degrees leading to published scientific work in reputable journals, as well as training in the panoply of research and presentation skills required to conduct and disseminate the research. Students are provided with a curriculum of integrated courses that include the essentials for biomedical research as well as courses that span cellular, developmental, systems, and behavioral neurosciences, as well as neuroanatomy and injury and disease of the nervous system. Upon completing these programs, students pursue careers in academic, governmental, or industrial settings.

The MS in Neuroscience Program

The MS program provides students a broad background in neuroscience and the techniques used in neuroscience research. In addition to the thesis-based MS program, Drexel offers a non-thesis degree program in which students can earn the degree without a research project by taking additional classes and writing a literature review paper. Students who wish to continue their graduate training after the MS degree may apply to the PhD program, and their credits may be applied to the doctoral program.

The PhD in Neuroscience Program

The PhD program trains individuals to conduct independent hypothesis-driven research and to teach in the neurosciences. The program includes two years of coursework as well as original research leading to published thesis work. Laboratory rotations begin in the fall of the first year.

For more information, visit the College of Medicine's Neuroscience Program (http://www.drexelmed.edu/Home/AcademicPrograms/ BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/ Neuroscience.aspx) web site.

Admission Requirements

Students interested in cellular, systems (including neuro-engineering) and behavioral neuroscience are encouraged to apply. There are no minimal requirements but applicants should be competitive with regard to grades, GRE scores, research experience, and letters of recommendation. Applicants are encouraged to use email to contact any of the faculty of the program with whom they may share scientific interests to discuss their suitability to the program and/or potential projects in relevant laboratories.

The Drexel University College of Medicine: School of Biomedical Sciences and Professional Studies has a rolling admissions policy, which means that complete applications are reviewed as they are received. Applicants are therefore advised to apply early, as decisions to accept or deny admission may be made before the official deadlines.

To learn more about applying to Drexel College of Medicine programs visit the College of Medicine's Biomedical Studies (http://www.drexelmed.edu/ Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/ MastersandDoctoral.aspx) website.

About the Curriculum

Students in both the PhD and MS programs begin their coursework with a core curriculum. The curriculum consists of a series of core courses that are shared by all of the biomedical graduate programs in the medical school, and a series of programmatic courses. All students in the Neuroscience Program must take the core curriculum, although the possibility exists for students to be excused from a particular course if they are able to prove that they already have the necessary knowledge required of the particular course.

During the second year, students select elective courses and begin their thesis research in consultation with the Advisory-Examination Committee. At the end of the second year, students take a comprehensive examination to qualify for PhD candidacy.

There are three rotations in the curriculum for which the student will be assigned a grade. The purpose of these rotations is to enable the student to select the most appropriate Graduate Advisor to supervise the research project for the student. The Neuroscience Program Director and Steering Committee will advise each student on the selection of rotations,

as well as on the progress and outcome of rotations. Flexibility will be afforded in certain situations in which the student may be able to select an advisor before completing all three rotations, or in situations wherein it is advisable to terminate a particular rotation early in favor of another choice.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

MS Degree Requirements: Non-Thesis Option

MS without thesis: 36.0 semester credits

Required Courses

ANAT 501S	Neurobiology Topics I	2.0
ANAT 602S	MEDICAL NEUROSCIENCE	6.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 609S	Graduate Neuroscience II	4.0
NEUR 508S	Graduate Neuroscience I	2.5
Advanced Neuroscience Course		
Select at least one of the following:		1.0-4.0
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	MOTOR SYSTEMS	
Additional Suggested Electives		
Suggested Electives (min. 2.5 credits) [*]		2.5
MCBG 506S	ADVANCED CELL BIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHGY 503S	GRADUATE PHYSIOLOGY	
Total Credits		**36.0-39.0**

[*]   Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/ Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

MS Degree Requirements: Thesis Option

MS with thesis: 48.0 minimum semester credits

Required Courses

ANAT 501S	Neurobiology Topics I	2.0
or PHRM 502S	Current Topics in Pharmacology & Physiology	
ANAT 602S	MEDICAL NEUROSCIENCE	6.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	

IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 501S	Neuroscience 1st Lab Rotation	4.0
NEUR 502S	Neuroscience 2nd Lab Rotation	4.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 600S	Neuroscience Thesis Research	9.0
NEUR 609S	Graduate Neuroscience II	4.0

Advanced Neuroscience Course

Select at least one of the following:		1.0-4.0
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	MOTOR SYSTEMS	

Suggested Electives *

MCBG 506S	ADVANCED CELL BIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHGY 503S	GRADUATE PHYSIOLOGY	
Total Credits		**55.5-58**

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

PhD Degree Requirements

Students are required to complete 96.0 credits; for additional graduation requirements, refer to the Biomedical Graduate Studies Handbook and the Neuroscience Program Policies and Procedures (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/Neuroscience.aspx).

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

PhD students may enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the degree completion requirement of 96.0 credits.

Required Courses

ANAT 501S	Neurobiology Topics I	1.0-2.0
or PHRM 502S	Current Topics in Pharmacology & Physiology	
ANAT 602S	MEDICAL NEUROSCIENCE	6.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0

NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 501S	Neuroscience 1st Lab Rotation	4.0
NEUR 502S	Neuroscience 2nd Lab Rotation	4.0
NEUR 503S	Neuroscience 3rd Lab Rotatin	4.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 600S	Neuroscience Thesis Research (multiple semesters, as required)	54.0-72.0
NEUR 609S	Graduate Neuroscience II	4.0

Advanced Neuroscience Course

Select at least one of the following:		1.0-4.0
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	MOTOR SYSTEMS	

Suggested Electives *

MCBG 506S	ADVANCED CELL BIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 507S	Prin of Neuropharmacology	

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx) programs.

Pharmacology and Physiology

Major: Pharmacology and Physiology
Degree Awarded: Master of Science (MS) and Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 43.0-60.0 (MS); 96.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.1002
Standard Occupational Classification (SOC) code: 19-1042

About the Programs

The Department of Pharmacology and Physiology offers graduate programs leading to the MS and the PhD degrees. The programs require independent research under the direction of departmental faculty members who are engaged in highly active research programs involving molecular, cellular, and behavioral approaches to experimental pharmacology and physiology in a strongly collaborative environment.

Students in both the PhD and MS programs begin their coursework with a core curriculum in biomedical sciences, and immediately start laboratory rotations. Intensive graduate level pharmacology, physiology and neuropharmacology courses round out the core programmatic courses. Specialization in ion channel physiology, smooth muscle physiology, behavioral pharmacology and signal transduction processes may involve the taking of several elective courses. Each program requires the defense of a thesis based on original research.

About the MS Program

The MS program, requiring two years of full-time study, provides a broad knowledge and technical expertise in pharmacology and physiology, allowing graduates to become partners in research in either an academic or an industrial environment. Students who wish to continue their graduate

studies after the MS degree may apply to the PhD program, and their course credits may be applied to the doctoral program.

About the PhD Program

PhD candidates must pass a qualifying examination by November of their third year and they must have one accepted co-author manuscript and one submitted first-author manuscript in peer-reviewed journals during the course of the program.

Admission Requirements

Drexel University College of Medicine has a rolling admissions policy, which means that complete applications are reviewed as they are received. Applicants are therefore advised to apply early, as decisions to accept or deny admission may be made before the official deadlines. To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's Biomedical Studies (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx) website.

MS/PhD Degree Requirements

About the Curriculum

The core curriculum is a comprehensive interdisciplinary program of study for all first-year research master's and PhD students in the Biomedical Graduate Studies programs. The goal of the core curriculum is to provide a broad foundation in biomedical sciences and serve as a framework for advanced study in more specialized areas.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information about scheduling and developing a plan of study, visit the College of Medicine's Pharmacology and Physiology (http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/PharmacologyPhysiology.aspx) page.

MS Program Requirements

MS Degree Requirements: Non-Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
or NEUR 500S	Statistics for Neuro/Pharm Research	
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
PHRM 502S	Current Topics in Pharmacology & Physiology	1.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0
Advanced Pharmacology and Physiology electives		**4.0**

Students are required to select a minimum of three advanced electives. Students normally consult with their committee to select advanced electives.		9.0
Total Credits		**44.0**

MS Degree Requirements: Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
or NEUR 500S	Statistics for Neuro/Pharm Research	
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PHRM 502S	Current Topics in Pharmacology & Physiology	1.0
PHRM 503S	Pharm & Phys 1st Lab Rotation	4.0
PHRM 504S	Pharm & Phys 2nd Lab Rotation	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
PHRM 600S	Pharmacology Thesis Research	9.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0
Advanced Pharmacology and Physiology Electives		
Students are required to select a minimum of two advanced electives. For more information about advanced elective options, visit the College of Medicine's Pharmacology and Physiology website.		8.0
Total Credits		**61.0**

PhD Program Requirements

PhD Degree Requirements

Required Courses

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
or NEUR 500S	Statistics for Neuro/Pharm Research	
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PHRM 502S	Current Topics in Pharmacology & Physiology	1.0
PHRM 503S	Pharm & Phys 1st Lab Rotation	4.0
PHRM 504S	Pharm & Phys 2nd Lab Rotation	4.0
PHRM 505S	Pharm & Phys 3rd Lab Rotation	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
PHRM 600S	Pharmacology Thesis Research	9.0

PHGY 503S	GRADUATE PHYSIOLOGY	4.0

Advanced Pharmacology and Physiology Electives

Students are required to select a minimum of two advanced electives. For more information about advanced elective options, visit the College of Medicine's Pharmacology and Physiology website.	8.0

Additional Electives

Students are required to select additional electives to complete the minimum of 96.0 credits for graduation. Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies programs.	

Total Credits	**96.0**

Goodwin College of Professional Studies

The Goodwin College of Professional Studies offers the Masters in Professional Studies program which is designed for individuals and practitioners with established career paths who are interested in developing marketable skills to meet evolving workforce demands; seeking professional development; and expanding promotional opportunities.

Major

Professional Studies (MS) (p. 106)

Professional Studies

Major: Professional Studies
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 30.0000
Standard Occupational Classification (SOC) code: 11-9199

Note: Effective Winter Term 2014, students are no longer being accepted into this program.

About the Program

The MS in Professional Studies degree contains a common core of knowledge and skills relevant for 21st century professionals in nearly every field. The curriculum is the result of a collaboration of research and scholarship with practical, industry-inspired experience and consists of a solid foundation of core courses, plus a choice of one of the following concentrations:

The degree contains a common core of knowledge and skills relevant for 21st century professionals in nearly every field. The degree also will provide knowledge and skills for immediate application in three important professional fields of study:

- **Creativity and Innovation Concentration**
  Students will form an in depth understanding of creativity, enhanced communication, and creative problem solving, while learning how these may be applied to practical situations that further workplace culture of creativity.
- **Educational Policy Concentration**
  Students will learn the factors involved in educational policy-making and how to apply educational policy-making skills in their professional roles where applicable. The concentration is designed to prepare educators of all types in the decision-making process of educational policy development.
- **E-Learning Leadership Concentration**
  Students will acquire knowledge of online and distance learning leadership theory and practice in emerging information and communication technologies, multimedia pedagogical strategies, and e-learning design and delivery.
- **Homeland Security Management Concentration**
  Students will develop competencies relating to homeland security strategy and policy development, national security issues in terrorism, critical infrastructure protection, intelligence, land and maritime border and port protection, and developing technologies in homeland security.
- **Human Resource Development Concentration**
  Students will develop the skills they need to strategically lead human resource development and align organizational learning with organizational goals. This concentration program addresses specific topics in human resource development, such as coaching and mentoring, implementing and evaluating change, performance competencies, and designing and developing multimedia applications for learning.

The Masters in Professional Studies is a part-time graduate degree program that is offered entirely online.

Admission Requirements

Acceptance to the program requires:

- Completed online application (http://www.drexel.com/online-degrees/business-degrees/ms-prof-studies/apply.aspx) form
- Bachelor's degree from an accredited institution
- Undergraduate GPA of 3.0 or higher (graduate degree GPAs will be considered along with the undergraduate GPA). Applicants with a cumulative GPA below 3.0 may be considered.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online (customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions.
- Two letters of recommendation. Drexel University Online now accepts electronic letters of recommendation. Submission instructions are available at: http://www.drexel.edu/apply/recommend. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal essay — between 500-750 words, describing your interest in the program. Specifically, please discuss the following:
  - How the program relates to your previous educational activities
  - If changing course, why are you moving in a new direction with your educational goals
  - How the program relates to your current line of work
  - How you plan to apply the program to your future goals
- Resume
- International students must submit a TOEFL score of 550 or higher. View additional International students requirements (http://www.drexel.com/online-degrees/education-degrees/ms-humanresourcedevelopment/international.aspx).
- An interview may be requested.

Degree Requirements

Core Courses

PRST 501	Communication for Professionals	3.0
PRST 503	Ethics for Professionals	3.0
PRST 504	Research Methods & Statistics	3.0
PRST 612	Data Analysis and Interpretation	3.0
PRST 615	Program Evaluation	3.0
PROJ 501	Introduction to Project Management	3.0
Concentration		18.0

Select one of the following concentrations:

Creativity & Innovation Concentration

CRTV 501	Foundations in Creativity
CRTV 502	Tools and Techniques in Creativity
CRTV 503	Creativity in the Workplace
CRTV 610	Creativity and Change Leadership
CRTV 620	Research Methods and Assessment of Creative and Innovative Thinking
CRTV 630	Global Perspectives on Creativity

Educational Policy Concentration

EDPO 620	Education Policy: Concepts, Issues, and Applications
EDPO 624	Shaping of American Education Policy: Global Forces
EDPO 628	American Educational Policy and U.S. Competitiveness
EDPO 632	Ethics in Educational Policy Making
EDPO 636	Access & Equity in Educational Policy Making
EDPO 640	Educational Policy-Making Tactics & Influence

E-Learning Leadership Concentration

ELL 501	The Purpose and Business of E-Learning
ELL 502	E-Learning Technologies
ELL 503	Teaching and Learning Issues in E-Learning
ELL 504	Learning Technologies & Disabilities
ELL 604	Design & Delivery of E-Learning I
ELL 605	Design & Delivery of E-Learning II

Homeland Security Management Concentration

HSM 544	Introduction to Homeland Security
HSM 549	Terrorism and Homeland Security
HSM 554	Critical Infrastructure Protection
CST 604	Technology for Homeland Security
CST 609	National Security Intelligence
CST 614	Counterintelligence

Human Resource Development

EDUC 811	Designing and Developing Multimedia Applications For Learning
EHRD 500	Foundations of Human Resources Development [*]
EHRD 601	Leading and Evaluating Change
EHRD 602	Coaching and Mentoring for Sustainable Learning
EHRD 603	Strategic Competencies for HRD Leaders
EHRD 605	Organizational Learning & Strategy

Electives		3.0

Select one of the following:

HSM 644	Public Management in Crisis	
HSM 645	Emergency Incident Risk Management	
PRST 640	Policy Analysis	
PRST 603	Communicating in Virtual Teams	
PRST 690	Course PRST 690 Not Found	
Capstone Requirements		6.0

Students complete one of the following capstone course sequences in their chosen area of concentration:

Creativity

CRTV 695	Applied Project in Creativity Studies I
CRTV 696	Applied Project in Creativity Studies II

E-Learning Leadership

ELL 695	Applied Project in E-Learning Leadership I
ELL 696	Applied Project in E-Learning Leadership II

Educational Policy

PRST 690	Course PRST 690 Not Found [**]
PRST 690	Course PRST 690 Not Found [**]

Homeland Security Management

HSM 695	Applied Project in Homeland Security Management I
HSM 696	Applied Project in Homeland Security Management II

Human Resource Development

PRST 690	Course PRST 690 Not Found [**]
PRST 690	Course PRST 690 Not Found [**]

Total Credits	**45.0**

[*]   Students with an MS in Human Resource Development are not required to take EHRD 500.
Students wishing to complete the Certificate in Human Resource Development (http://www.drexel.edu/catalog/certificates/edu-hr.htm) must take an additional course, EHRD 604 Developing Human Resources.

[**]   The special topics courses are placeholders while the capstone courses in these fields are undergoing approval.

College of Nursing and Health Professions

The College of Nursing and Health Professions offers a wide range of graduate programs. Many programs offer flexible scheduling, making it possible for students to continue their education with night and weekend courses. Others are web-based programs available online.

Majors

- Art Therapy and Counseling (MA) (p. 169)
- Couple and Family Therapy (PhD) (p. 122)
- Dance/Movement Therapy and Counseling (MA) (p. 124)
- Family Therapy (MFT) (p. 173)
- Creative Arts Therapies (PhD) (p. 182)
- Health Administration (MHA) (p. 174)
- Human Nutrition (MS) (p. 178)
- Music Therapy and Counseling (MA) (p. 171)
- Nurse Anesthesia (MSN) (p. 137)
- Nursing Practice (DNP) (p. 128)
- Nursing - Advanced Role (MSN)
  - Clinical Nurse Leader (p. 144)
  - Clinical Trials Research (p. 147)
  - Nursing Education (p. 151)
  - Nursing Innovation (p. 153)
  - Nursing Innovation and Intra/Entrepreneurship (p. 135)
  - Nursing Leadership and Health Systems Management (p. 138)
  - MSN-Bridge Program (p. 134)
- Nursing - Nurse Practitioner (MSN)
  - Adult-Gerontology Acute Care Nurse Practitioner
  - Adult-Gerontology Primary Care Nurse Practitioner (p. 140)
  - Family/ (p. 149)Individual Across the Lifespan Nurse Practitioner (p. 149)
  - Pediatric Acute Care Nurse Practitioner (p. 159)
  - Pediatric Primary Care Nurse Practitioner (p. 161)
  - Pediatric Primary Care and Pediatric Acute Care Dual Option Nurse Practitioner (p. 162)
  - Psychiatric Mental Health Nurse Practitioner (p. 166)
  - Women's Heath/Gender Related Nurse Practitioner (p. 167)
- Nursing (PhD) (p. 185)
- Nutrition Sciences (PhD) (p. 189)
- Physical Therapy (DPT) (p. 130)
- Rehabilitation Sciences
  - Rehabilitation Sciences (DHSc) (p. 126)
  - Rehabilitation Sciences (MHS, PhD) (p. 197)
- Physician Assistant (MHS)
  - MHS with PA Certificate Program (p. 176)
  - Post-Professional Master's Program (p. 190)

Certificates

- Art Therapy (p. 193)
- Complementary and Integrative Therapies (p. 119)
- Couple and Family Therapy (p. 112)
- Dance/Movement Therapy (p. 194)
- Forensic Trends and Issues in Contemporary Healthcare (p. 113)
- Holistic Hospice and Palliative Care (p. 120)
- Hand and Upper Quarter Rehabilitation (p. 112)
- Integrative Addiction Therapies (p. 121)
- Issues in Human Trafficking (p. 134)
- Medical Family Therapy (p. 109)
- Music Therapy (p. 195)
- Nurse Anesthesia (p. 196)
- Nursing Certificates - Advanced Role
  - Clinical Nurse Leader Post-Graduate Certificate (p. 146)
  - Clinical Trials Research (p. 112)
  - Nursing Innovation (p. 149)
  - Integrated Nursing Care of Autism Spectrum Disorder (p. 192)
  - Nursing Education Post-Bachelor's Certificate (p. 114)
  - Nursing Education Post-Master's Certificate (p. 158)
  - Nursing Leadership and Health Systems Management (p. 114)
- Nursing Certificates - Nurse Practitioner
  - Adult-Gerontology Acute Care Nurse Practitioner Post-Master's Certificate
  - Adult-Gerontology Primary Care Nurse Practitioner Post-Master's Certificate (p. 110)
  - Family/Individual Across the Lifespan Nurse Practitioner Post-Master's Certificate (p. 132)
  - Pediatric Acute Care Nurse Practitioner Post-Master's Certificate (p. 180)
  - Pediatric Primary Care Nurse Practitioner Post-Master's Certificate (p. 115)
  - Pediatric Primary Care and Pediatric Acute Care Dual Nurse Practitioner Post-Master's Certificate (p. 181)
  - Psychiatric Mental Health Nurse Practitioner Post-Master's Certificate (p. 116)
  - Women's Health/Gender Related Nurse Practitioner Post-Master's Certificate (p. 200)
- Pediatric Rehabilitation (p. 116)
- Substance Use Disorder Treatment (p. 118)
- Veterans' Healthcare (p. 118)
- Women's Integrative Health (Advanced Study) (p. 121)

About the College

As the practice of medicine has become more complex with the advent of technology and new drug therapies, so has the provision of health services. An increasingly diverse, aging US population experiencing higher rates of chronic illness is demanding more service and culturally competent care. While technology improvements help provide the means to deliver safer, high-quality care, our society is facing shortages in health professionals such as nurses, mental health workers, nurse anesthetists, physician assistants, and rehabilitation science professionals. The demand for these and other skilled professionals continues to increase and is expected to remain steady well into the 21st century. There is no more vibrant a place to prepare for these kinds of meaningful, rewarding careers than at Drexel University's College of Nursing and Health Professions (http://www.drexel.edu/cnhp). The College offers associate's,

bachelor's, master's, and doctoral degrees in more than a dozen health care fields.

Just as the health profession disciplines have come of age, so has the College of Nursing and Health Professions. Founded in 1969 as the College of Allied Health Professions with just three degree programs and a faculty of five, the college has undergone a remarkable evolution. Today it serves over 3,000 students, with a broad array of contemporary program offerings. Along the way, it has earned widespread recognition and accreditation for the education of health professionals.

Mission and Approach

The College believes that the health care needs of today and tomorrow can best be met by professionals who have expertise in their own fields and a concurrent understanding of other health disciplines. In addition to providing a broad-based education that balances academic learning with clinical training, the University promotes collaboration among students in our College of Nursing and Health Professions, our School of Public Health, and the College of Medicine, which draws from the rich traditions of predecessors Hahnemann University and the Medical College of Pennsylvania.

Teamwork is as important in academics as it is in health care. The College of Nursing and Health Professions' dedicated and knowledgeable faculty members work closely with students, providing a supportive and creative learning environment. Graduates from the College possess a wide range of experiences and the knowledge, compassion, and lifelong learning skills needed to become accomplished health care professionals.

The student body, which is diverse in age and culture, reflects Drexel University's commitment to provide qualified students with an opportunity for advanced education. Drexel welcomes nontraditional applicants and especially encourages applications from underrepresented minorities and those interested in practicing in underserved areas.

Many of Drexel's College of Nursing and Health Professions programs offer flexible scheduling, making it possible for students to continue their education through part-time, online, night, or weekend study.

Accreditation

Nursing programs are accredited by the CCNE (Commission on Collegiate Nursing Education), and the PA State Board of Nursing.

The Couple and Family Therapy MFT degree and Post-Master's Certificates are accredited by COAMFTE (Commission on Accreditation of Marriage and Family Therapy Education).

The Creative Arts in Therapy MA degrees in Dance/Movement Therapy, Music Therapy, and Art Therapy are approved by the ADTA (American Dance Therapy Association),the AMTA (American Music Therapy Association), and the AATA (American Art Therapy Association), respectively.

The Didactic Program in Nutrition is accredited by ACEND (Accreditation Council for Education in Nutrition and Dietetics.
The Health Services Administration program is certified by AUPHA (Association of University Programs in Health Administration).

The Nurse Anesthesia program is accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs.

The Professional Physical Therapy (DPT) program is accredited by CAPTE (Commission on Accreditation in Physical Therapy Education).

The Physician Assistant program is accredited by ARC-PA (Accreditation Review Commission on Education for the Physician Assistant).

Certificate Program in Medical Family Therapy

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Certificate
Number of Credits to Completion: 14.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.1505
Standard Occupational Classification (SOC) Code: 21-1013

This certificate program is offered to those individuals who have earned a master's degree and seek further education. The program, offered online, is designed to introduce a variety of currently practicing health care professionals to the ways acute and chronic medical illnesses and conditions influence and are influenced by psychosocial, relational, and family conditions and environments. Additionally, couple and family therapists and other professionals trained in the sub-specialty of medical family therapy (or collaborative healthcare) will learn to work cooperatively to bridge gaps in the health care systems, and provide comprehensive and culturally congruent family focused services.

Required Courses

MFTP 518	Medical Family Therapy	3.0
MFTP 537	Multicultural & Family Systems Approach to Healthcare	4.0
MFTP 538	Issues and Trends in Health Policy for Families	3.0
Select one of the following:		4.0
CFTP 500	Introduction to Systems Theory	
CFTP 501	Introduction to Family Therapy	
CFTP 503	Historical and Sociocultural Influences	
CFTP 505	Bowen Theory	
CFTP 508	Structural Family Therapy	
CFTP 510	Sex Therapy	
CFTP 517	Addictions in The Family	
CFTP 519	Family Violence	
CFTP 520	Family Life Cycle	
CFTP 537	Nosology & Couple and Family Therapy Practice	
Total Credits		**14.0**

Adult-Gerontology Acute Care Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Graduate
Number of Credits to Completion: 39.0

Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3822
Standard Occupational Classification (SOC) Code: 29-1171

This certificate is offered to those individuals who have earned a master's degree in nursing and seek further preparation as an Adult Gerontology Acute Care Nurse Practitioner (AG-ACNP). Transcripts will be reviewed and course work will be determined on an individual basis. Students meet on campus for mandatory On-Campus Intensive (OCI) learning experiences, simulation, and evaluation. Graduates will be eligible to sit for the ANCC's Adult Gerontology Acute Care Certification Examination.

Program of Study
All incoming post masters students have the opportunity for previous coursework to be evaluated on an individual basis for transfer of credit. Students should check with the MSN Program Transfer Credit Evaluator for the exact schedule. Acute care pharmacology is required prior to beginning the clinical courses.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.

- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.

- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.

- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.

- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.

- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.

- Applicants seeking admission into the AG-ACNP Post-Graduate Certificate Program must complete 640 clinical practicum hours. Accepted students will need to be issued a Pennsylvania RN license in addition to their current RN license if it is not from Pennsylvania

- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.

- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibilty for previously faculty supervised clinical hours. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.

- A personal interview may be required (online or telephone options will be available).

Required Courses

Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
Concentration Courses		
NURS 554	Pharmacology for Adult-Gerontology Acute Care Nurse Practitioners	3.0
NURS 570	Adult Gerontology Acute Care NP I: Introduction to Adult Gerontology Acute Care Medicine	5.0
NURS 571	Adult Gerontology Acute Care Nurse Practitioner II: Mgnt/Care of Patients in Acute/Crit Care Med Set	5.0
NURS 572	Adult Gerontology Acute Care Nurse Practitioner III: Mgnt/Care of Patients in Acute Surgical Setting	5.0
NURS 573	Adult Gerontology Acute Care NP IV: Management of Care of Patients in Critical Care Settings	5.0
NURS 580	Adult Gero Acute Care NP V: Mgmt/Care of Clients in Acute, Critical Care, Med or Surg Settings	5.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Total Credits		**39.0**

Adult-Gerontology Primary Care Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's certificate
Number of Credits to Completion: 34.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 51.3822
Standard Occupational Classification (SOC) Code: 29-1171

The Post-Master's Certificate in Adult-Gerontology Primary Care (A-GPC) Nurse Practitioner program is intended for MSN prepared professionals who would like to gain further knowledge in the primary care continuum. It is designed to prepare practitioners who will take advanced nursing roles as clinicians, educators, researchers, and leaders in the rapidly changing, evidence-driven healthcare environment. Emphasis is placed on evidence-based practice, interdisciplinary collaboration, and critical use of evolving technology. Graduates will be prepared to provide care for adults throughout their lifespan to promote maximal health, reduce risks and manage acute and chronic health condition.

Graduates will be eligible to apply for certification as an Adult-Gerontology Primary Care Nurse Practitioner through the American Academy of Nurse Practitioners (AANP) and American Nurses Credentialling Center (ANCC).

The program is 34.0 credits and can generally be completed in two years of part-time study. Six hundred and forty (640) clinical hours are required for completion of the program.

Program of Study

All incoming post masters students have the opportunity for previous coursework to be evaluated on an individual basis for transfer of credit. Students should check with the MSN Program Transfer Credit Evaluator for the exact schedule. Adult -Gerontology Primary Care pharmacology is required prior to the beginning of the clinical courses.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.
- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.
- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.
- Applicants seeking admission into the A-GPC Post-Graduate Certificate Program must complete 640 clinical practicum hours. Accepted students will need to be issued a Pennsylvania RN license in addition to their current RN license if it is not from Pennsylvania
- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.
- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibilty for previously faculty supervised clinical hours. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.
- A personal interview may be required (online or telephone options will be available).

Program Requirements

Students meet on campus for a mandatory On-Campus Intensive learning experiences, simulation, and evaluation. Graduates will be eligible to sit for the ANCC's Adult Gerontology Primary Care Certification Examination.

Sample Plan of Study

Term 1		Credits
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
	Term Credits	**7.0**
Term 2		
NURS 641	Advanced Pharmacology for Adult-Gerontology Primary Care Nurse Practitioners	3.0
	Term Credits	**3.0**
Term 3		
NURS 550	Advanced Clinical Assessment Diagnostic Reasoning Across the Lifespan	4.0
	Term Credits	**4.0**
Term 4		
NURS 660	Adult-Gero Primary Care I: Introduction to Adult-Gero Primary Care and Care of the Young-Adult	5.0
	Term Credits	**5.0**
Term 5		

NURS 661	Adult-Gerontology Primary Care II: Management and Care of Adult Patients in Primary Care	5.0
	Term Credits	**5.0**
Term 6		
NURS 662	Adult-Gerontology Primary Care III: Management of the Older-Adult Patient in Primary Care	5.0
	Term Credits	**5.0**
Term 7		
NURS 663	Adult-Gerontology Primary Care IV: Gerontology Management and Care	5.0
	Term Credits	**5.0**

Total Credit: 34.0

Certificate in Advanced Practice in Hand and Upper Quarter Rehabilitation

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Bachelor's
Number of Credits to Completion: 16.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.2308
Standard Occupational Classification (SOC) Code: 29-1123

The Certificate in Hand and Upper Quarter Rehabilitation program is designed for practicing clinicians in physical therapy and occupational therapy who wish to gain advanced understanding of the upper quarter, including the cervical spine, shoulder, elbow, wrist, and hand. This program consists of four courses offered in an online and weekend format.

The curriculum is based on the most recent hand therapy practice analysis conducted by the Hand Therapy Certification Commission (HTCC). The HTCC oversees the certification process for qualifying occupational and physical therapists as "certified hand therapists" or CHTs. This Certificate of Advanced Practice in Hand and Upper Quarter Rehabilitation is recognized by HTCC as a resource to assist with preparation for the CHT examination.

After successfully completing the four required courses, students receive a post-professional certificate of completion. The credits may be transferred into degree programs within Physical Therapy and Rehabilitation Sciences.

Foundations of Practice Requirements

PTRS 767	Foundations in Hand Therapy	4.0
PTRS 768	Upper Quarter Joint Pathology	4.0
PTRS 769	Nerve Injuries of the Upper Quarter	4.0
PTRS 770	Diseases That Affect the Hand	4.0
Total Credits		**16.0**

For more information, visit the College's Hand Therapy Certificate web page (https://www.drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Advanced-Practice-Hand-and-Upper-Quarter-Rehabilitation). To apply, please visit the program's Drexel University Online web page (http://www.drexel.com/online-degrees/nursing-degrees/cert-hand).

Certificate in Clinicals Trials Research

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 14.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0719
Standard Occupational Classification (SOC) Code: 11-9111

Note: Effective Winter Term 2014, students are no longer being accepted into this certificate program.

The certificate program is designed for individuals who have earned an undergraduate degree in nursing and seek further preparation in clinical trials research. This online program is designed for nurses who wish to be involved in clinical trials and research in a variety of roles and settings. Graduates of this program assume roles such as:

- Research Coordinator
- Clinical Scientist
- Clinical Trials Manager
- Coordinator
- Developer

Many potential employers exist outside the hospital environment—in the community or private practices and with pharmaceutical and other scientific companies that produce, test, and market new products. The clinical trials field is a hot field for nursing employment—especially seasoned nurses who have expertise in one or more clinical areas.

Required Courses

NURS 582	Foundation of Good Clinical Practice in Clinical Trials Mngmt	3.0
NURS 583	Operational Leadership in Clinical Trials Management	3.0
NURS 584	Current Topics in Clinical Trials	3.0
NURS 585	Clinical Trials Research Practicum	5.0
Total Credits		**14.0**

Additional Information

For more information about this program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu
267.359.5691

Certificate in Couple and Family Therapy

Certificate Level: Graduate
Admission Requirements: Master's degree

Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 43.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 51.1505
Standard Occupational Classification (SOC) Code: 21-1013

About the Program

Drexel University offers a post-master's program leading to a certificate in couple and family therapy. The program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE) of the American Association for Marriage and Family Therapy (AAMFT). The post-master's certificate in couple and family therapy can be expected to lead towards licensure as a Marriage and Family Therapist, meets the foundational educational and clinical to become credentialed as an Emotionally Focused Therapist and satisfies the Pre-Clinical Membership requirements for AAMFT.

Clinical Practicum Experience

PMC students are enrolled in practicum for 4 consecutive quarters. Interns generally participate in one practicum site during their tenure in the PMC. All interns must complete a continuous 12-month calendar year at one practicum site prior to graduation. Interns will be expected to spend 20 hours per week working at the approved program practicum site. Scheduling of specific times will be negotiated by the intern, on-site supervisor and CFT Director of Clinical Training. Interns will receive supervision from AAMFT Approved Supervisors/or Equivalent and Credentialed Emotionally Focused Therapist Supervisors. The practicum schedule must not conflict with class schedule. Interns are expected to average 13-15 client contact hours per week in order to achieve the 350 clinical hour requirement by the end of the program. Case loads usually consist of more than 14 clients to ensure that the intern will average 13-15 client contact hours per week.

Curriculum

The curriculum assists students in integrating theory and practice. Issues of race, ethnicity, culture, class, gender, sexual orientation, spirituality, religion, age, ability, power, and privilege are addressed throughout the program. Students are fully trained to assume clinical practice in couple and family therapy.

Required Courses

	Theoretical Foundations	
CFTP 501	Introduction to Family Therapy	4.0
CFTP 503	Historical and Sociocultural Influences	4.0
	Clinical Practice	
CFTP 508	Structural Family Therapy	4.0
	Individual Development and Family Relations	
CFTP 520	Family Life Cycle	4.0
	Professional Identity and Ethics	
CFTP 522	Legal and Ethical Implications in Couple and Family Therapy Practice	4.0
	Research	
CFTP 525	Research in Couple and Family Therapy	4.0
	Required Additional Learning	
CFTP 526	Person of the Therapist Experience I	2.0
CFTP 527	Person of the Therapist Experience II	2.0
CFTP 753	Introduction to Emotionally Focused Therapy	4.0
CFTP 754	Core Skills in Emotionally Focused Therapy	4.0
Electives		
CFTP 505	Bowen Theory	
CFTP 506	Contextual Theory and Therapy	
CFTP 507	Collaborative Approaches	
CFTP 509	Couples Therapy	
CFTP 510	Sex Therapy	
CFTP 511	Object Relations Theory	
CFTP 512	Behavioral Models of Family Therapy	
CFTP 517	Addictions in The Family	
CFTP 518	Medical Family Therapy	
CFTP 519	Family Violence	
CFTP 537	Nosology & Couple and Family Therapy Practice	
Practicum		
CFTP 530	Practicum I	2.0
CFTP 531	Practicum II	2.0
CFTP 532	Practicum III	2.0
CFTP 533	Practicum IV	1.0
Total Credits		**43.0**

Certificate in Forensic Trends and Issues in Contemporary Healthcare

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 43.0106
Standard Occupational Classification (SOC) Code: 19-4092

The certificate program examines contemporary trends and issues related to the wide range of interpersonal violence, crime and sudden violent death that may be encountered in a variety of healthcare settings. Theoretical tenets, methods for assessment and related implications for intervention and/or referral will be examined from a multifaceted perspective—including that of the offender, crime victim, families, and the healthcare community-at-large.

Program Goals

- Examine social attitudes and perceptions toward victimization and offending behavior;
- Identify the psychological, physical and legal aspects of victimization;
- Assess victim trauma and identify appropriate interventions for victimized clients;
- Assess the motivational intent and behavior patterns of offenders who commit aggressive crimes;

- Analyze institutional approaches and subsequent response patterns to victims and offenders in a variety of settings (e.g., inpatient, outpatient, primary care settings, academic, etc.);
- Assess ethical dimensions of healthcare issues relative to the role and scope of practice and healthcare providers;
- Examine healthcare policy assessment, development and/or modification to enhance health promotion of offenders and victims across the lifespan.

Admission

Admission to this program requires completion of a BS/BA degree. The program is intended for providers and educators in the healthcare sciences, as well as professionals who have direct contact with victims and/or offenders across disciplines and areas of practice (e.g. social workers, criminal justice, police, high school teachers, etc). The program is open to practitioners, graduate student and healthcare educators across the continuum of specialties and agencies.

Requirements

NURS 519	Forensic Science Foundations	3.0
NURS 528	Victimology – Contemporary Trend	3.0
NURS 533	Forensic Mental Health	3.0
Total Credits		**9.0**

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Forensic Trends and Issues in Contemporary Healthcare (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Forensic-Trends-and-Issues-in-Contemporary-Healthcare) web page and Drexel University Online's Forensic Trends and Issues in Contemporary Healthcare (http://www.drexel.com/online-degrees/nursing-degrees/cert-ftch) web page.

Certificate in Nursing Education

Certificate Level: Graduate
Admission Requirements: Bachelor's Degree
Certificate Type: Post Baccalaureate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3817
Standard Occupational Classification (SOC) Code: 25-1072

This certificate program provides a four-course grouping of classes that focus on knowledge and skills required for healthcare provider education roles. Courses are chosen from the MSN in Nursing Education curriculum. Upon completion of this certificate program, the student will have 12.0 graduate credits from an NLN/CCNE-approved master's in nursing program.

Required Courses

NURS 591	Foundations of Nursing Education	3.0
NURS 606	Curriculum Design for Higher Level Cognition	3.0
NURS 615	Assessment, Measurement and Evaluation	3.0
Select one of the following:		3.0
NURS 613	The Role and Responsibility of the Nursing Professor	
or NURS 616	Teaching Methods in Nursing Education	
Total Credits		**12.0**

Additional Information

For more information about this program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu
267.359.5691

Additional information is also available on Drexel's College of Nursing and Health Professions Nursing Education Certificate (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Nursing-Education-Faculty-Role) web page and on Drexel University Online's Nursing Education Certificate (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-cnf) web page

Certificate in Nursing Leadership in Health Systems Management

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-baccalaureate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3817
Standard Occupational Classification (SOC) Code: 25-1072

This certificate program focuses on development of a leadership style and skills set essential for individuals in or seeking administrative roles. The program provides a four-course grouping of classes from the MSN in Nursing Leadership in Health Systems Management curriculum. Selected classes provide essential skills for supervisory and management positions that help professionals perform in their expanded roles and grow as emerging leaders.

Emphasis will be placed on fiscal and organizational management, strategic planning, integrated quality outcomes measurement, organizational structures, marketing, and management of human resources within organizations. The program provides the student with information and strategies to problem solve, make decisions, resolve conflict and operationalize the mission and goals of the healthcare delivery organization.

Required Courses

NURS 557	Leadership and Stewardship in the Health Professions	3.0
NURS 558	Economics of Healthcare Management & Policy	3.0

NURS 559	Operations Management in Contemporary Healthcare Organizations	3.0
Select one of the following:		3.0
NURS 562	Workforce Management in Healthcare Organizations	
NURS 564	The Business of Healthcare	
NURS 567	Strategic Management: Power, Politics and Influence in Healthcare Systems	
Total Credits		**12.0**

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Nursing Leadership in Health Systems Management Certificate (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Nursing-Leadership-in-Health-Systems-Management) web page and Drexel University Online's Nursing Leadership in Health Systems Management Certificate (http://www.drexel.com/online-degrees/nursing-degrees/cert-lead) web page.

Pediatric Primary Care Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's
Number of Credits to Completion: 34.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3809
Standard Occupational Classification (SOC) Code: 29-1171

This certificate is offered to those individuals who have earned a master's degree in nursing and seek further preparation to become a Pediatric Primary Care Nurse Practitioner (PNP). Transcripts will be reviewed and course work will be determined on an individual basis. Students meet on campus for a mandatory On-Campus Intensive (OCI) learning experiences, simulation, and evaluation. Graduates will be eligible to sit for the ANCC's Pediatric Primary Care Nurse Practitioner Certification Examination and/or for the PNCB's Pediatric Primary Care Certification Examination.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once

accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.

- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.
- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.
- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.
- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.
- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibilty for previously faculty supervised clinical hours. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.
- A personal interview may be required (online or telephone options will be available).

Program of Study

All incoming post maters' s students have the opportunity for previous coursework to be evaluated on an individual basis for transfer credit. Students should check with the MSN Program Transfer Credit Evaluator for the exact schedule. Pediatric pharmacology is required prior to beginning the clinical courses.

Required Courses

Support Courses		
NURS 548	Advanced Pathophysiology	3.0

NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
Concentration Courses		
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
NURS 647	PNP III: Management and Care of Adolescents in the Primary Care Setting	5.0
NURS 648	PNP IV: Primary Care of Children with Special Health Care Needs	5.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Total Credits		**34.0**

Certificate in Pediatric Rehabilitation

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.2308
Standard Occupational Classification (SOC) Code: 29.1123

This program is for licensed physical and occupational therapists who work or aspire to work in early intervention, school-based therapy or other pediatric services and who seek to develop expertise in this field.

Graduates of the program will be prepared to enhance activity, participation and measurable outcomes for children and their families through the application of research, theory, and emergent knowledge to practice. Issues across the spectrum of care, for ages from birth to 21, are addressed and practitioners have the opportunity to enhance their comprehension of family and client-centered practice in a diversity of settings. The program incorporates philosophies of practice, issues of advanced clinical decision making, intervention and service delivery approaches, advocacy, and clinical leadership.

Students can tailor their studies and assignments to meet personal needs. Individualized assignments allow them to apply key themes and issues to practice. The program also offers physical therapists the opportunity and resources to prepare for specialty certification through the American Board of Physical Therapy Specialists.

After successfully completing the required credits, students receive a post-professional certificate of completion. The credits may be transferred into degree programs within Physical Therapy and Rehabilitation Sciences.

Requirements

Select 12.0 credits from the following:		12.0
PTRS 740	Issues in Pediatric Health & Rehabilitation	
PTRS 760	Pediatric Decision Making	
PTRS 761	Pediatric Clinical Application	
PTRS 772	Selected Topics in Pediatrics	
PTRS 780	Foundations of School-based Practice	
PTRS 781	Advanced Competencies in School-based Practice	

For more information, visit the College's Certificate in Pediatric Rehabilitation (https://www.drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Pediatric-Rehabilitation) web page. To apply, please visit the program's Drexel Online webpage (http://www.drexel.com/online-degrees/nursing-degrees/cert-pedsrehab).

This program is for licensed physical and occupational therapists who work or aspire to work in early intervention, school-based therapy or other pediatric services and who seek to develop expertise in this field.

Psychiatric Mental Health Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's
Number of Credits to Completion: 34.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional (CIP) Code: 58.3810
Standard Occupational Classification (SOC) Code: 29.1123

This certificate is offered to those individuals who have earned a master's degree in nursing and seek further preparation as a Psychiatric Mental Health Nurse Practitioner (PMHNP). Transcripts will be reviewed and course work will be determined on an individual basis. Students meet on campus for a mandatory On Campus Intensive (OCI) learning experiences, simulation, and evaluation. Once the certificate program is successfully completed, students will be eligible to sit for the ANCC's Psychiatric and Mental Health Certification Examination.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until

you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.

- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.
- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.
- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.
- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibilty for previously **faculty supervised clinical hours**. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.
- A personal interview may be required (online or telephone options will be available).

Program of Study

All incoming post-master's students in nurse practitioner tracks have the opportunity for previous coursework to be evaluated on an individual basis for transfer of credit. Students should check with the MSN Program Transfer Credit Evaluator for the exact schedule. Psychopharmacology is required prior to beginning the clinical courses.

Required Courses

Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
Concentration Courses		
NURS 555	Psychopharmacology Across the Lifespan	3.0
NURS 592	PMHNP I: Advanced Mental Health Nurse Practitioner Theoretical Foundations and Psychopathology I	5.0
NURS 593	PMHNP II: Advanced Mental Health Nurse Practitioner Theoretical Foundations and Psychopathology II	5.0
NURS 594	PMHNP III: Adv Mental Hlth NP Treatment Modalities for Diverse Populations Across the Lifespan	5.0
NURS 595	PMHNP IV: Adv Mental Hlth NP Management and Care of Clients in Diverse Pop Across the Lifespan.	5.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Total Credits		**34.0**

Certificate in Substance Use Disorder Treatment

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-baccalaureate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 34.0104
Standard Occupational Classification (SOC) Code: 21-1011

This certificate is designed for individuals with bachelor's degrees in psychology, social work, nursing, or other allied health professions who want to advance their knowledge of substance use disorders treatment and supervision practices. It is being offered through the Behavioral Health Counseling Department within the College of Nursing and Health Professions of Drexel University, and is designed for individuals working in health care settings serving people with substance use disorders. The certificate requires the completion of six online courses for a total of 18.0 quarter credits. Completion of this certificate does not in and of itself certify clinical expertise. The required coursework can also be applied toward a specialty focus area for students in the Innovations and Intra/Entrepreneurship Advanced Practice Nursing Track.

Each course focuses on a core competency needed to facilitate recovery from substance abuse. Students will acquire knowledge concerning the etiology of substance use behavior; the bio-psycho-social nature of addiction; substance use patterns across the lifespan and; recovery and relapse prevention. Students will also develop skills related to motivational enhancement, cognitive / behavioral change and workforce supervision.

Program goals

The goal of this certificate program is for students to:

- Gain an understanding of the bio-psycho-social dynamics of substance use;
- Develop evidence-based treatment competencies;
- Gain educational training hours to either obtain or maintain a credential as a drug/alcohol counseling professional.

In and of itself, this certificate does not take the place of supervised, clinical training, but rather serves as one of several possible components required to obtain a professional certification or clinical license to practice.

Program Requirements

Required Courses

BACS 534	Approaches to Substance Use Disorders	3.0
BACS 535	Motivational Enhancement Skills	3.0
BACS 540	Recovery and Relapse Prevention	3.0
BACS 568	Substance Use Counseling with Special Populations	3.0
BACS 560	Preventing Substance Use Disorders	3.0
BACS 570	Clinical Supervision Skills	3.0
Total Credits		**18.0**

Certificate in Veterans' Healthcare

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0701
Standard Occupational Classification (SOC) Code: 11-9111

Drexel University wants to salute veterans by providing a certificate to health care providers indicating the achievement of advanced understanding, comprehension and application of the issues surrounding the veteran who has returned to the United States. There are 21.6 million veterans in the United States and Puerto Rico and about 8 million of them are enrolled in the VA health care system. About 2/3 of our veterans are not receiving care at the Veterans Administration Health System, and most would be receiving health care in our civilian medical system.

This certificate program provides the learner with the knowledge and skills to provide our veterans with resources they might not be aware of, to recognize and refer if appropriate military specific medical problems and to provide the health care provider with the ability to identify and then treat health care issues within this unique population. Veterans have served our nation, and some have paid a personal health cost in that service. By completing this certificate, the health care provider will be able to identify, treat, refer and advocate for the veteran with specialized skills and knowledge, being more fully equipped to care for the medical needs of this unique group.

The certificate program is a four course, 12.0 credit certificate with three required courses and one additional course chosen from two electives. IPS 549: The Military and Veteran Cultures must be taken first, but the remaining courses may be taken in any order. Students will be required to take IPS 550 and IPS 551 but may elect to take either IPS 552 or CIT 552 (cross listed with NURS 552) as the fourth course.

Admission Requirements:

- Bachelor's degree (BA/BS) from a fully accredited program.
- 3.0 GPA or above on all previous coursework or last 60 credits completed.
- Official transcripts from all previous educational institutions required.
- Personal statement describing interest in certificate program.
- Curriculum Vitae or Resume.
- One professional letter of recommendation.

Required Courses

IPS 548	Foundations in Transdisciplinary Professional Collaboration	3.0
IPS 549	The Military and Veteran Culture	3.0
IPS 551	Veteran Advocacy	3.0
IPS 553	Neuroscience of Learning	3.0
Concentrations (6-9 credits)		
Health Professions		6.0
IPS 552	Veteran Healthcare Policy	

IPS 550	The Unique Health Care Needs of our Military and Veterans	
Substance Use Disorders (select 2)		6.0
BACS 534	Approaches to Substance Use Disorders	
BACS 535	Motivational Enhancement Skills	
BACS 540	Recovery and Relapse Prevention	
Education		6.0
EDAE 601	Foundations of Adult Education	
EDAE 602	Adult Learning and Development	
Legal Studies		9.0
LSTU 502S	Ethics and Professional Standards	
LSTU 505S	Health Care Quality, Patient Safety and Risk Management	
Business (select 2)		6.0
ORGB 625	Leadership and Professional Development	
ORGB 631	Leading Effective Organizations	
ORGB 640	Negotiations for Leaders	
Public Health (6 credits)		6.0
Select courses with approval		
Total Certificate Credits		18.0-21.0

Additional Information

For more information about this program, contact:

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267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Veterans' Healthcare (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Veterans-Healthcare) web page and Drexel University Online's Veterans' Healthcare (http://www.drexel.com/online-degrees/nursing-degrees/cert-cvh) web page.

Certificate of Advanced Study in Complementary and Integrative Therapies

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3300
Standard Occupational Classification (SOC) Code: 29-1199

The Certificate of Advanced Study in Complementary and Integrative Therapies (CIT) program is designed to provide practicing healthcare professionals with an "evidence-based program" in complementary and integrative therapies. This knowledge will allow them to assess, guide and evaluate patient use and to integrate CIT into their professional practice. The program provides students with the cultural and theoretical basis for applying complementary and integrative therapies while focusing on the skills and techniques of specific therapies.

This program is applicable to a wide range of healthcare professionals including nurses, nurse practitioners, physician's assistants, creative arts therapists, couple and family therapists, women's health practitioners, members of oncology organizations, members of AHNA and more. Admission requires a minimum of a bachelor's degree from an accredited college or university.

The program content is congruent with the educational standards set forth by the American Association of Holistic Nurses (AHNA) and the Foundations in Clinical Aromatherapy course adheres to the educational standards (level one) set forth by the National Association for Holistic Aromatherapy (NAHA).

Features and Benefits:

- Embraces the foundational principles of holistic Integrative care, focusing on the mind, body, spirit approach to achieve optimal health and healing within the framework of conventional healthcare.
- Courses are taught by internationally-recognized leaders in Complementary and Integrative Therapies and faculty trained in both conventional healthcare and integrative therapies.
- Program is taught wholly online in a highly dynamic learning format that engages students.

Admission Requirements:

Individuals submitting an application must fulfill the following:

- 2.75 GPA or above on all previous coursework
- Minimum of a bachelor's degree from an accredited college or university
- Official transcripts from all universities or colleges attended
- Nurse, physician assistants, and other healthcare professionals who hold licensure or a certificate: copy of license, eligibility for licensure, or certificate
- Current resume
- Completed application form
- Two letters of recommendation
- Personal statement (no more than two pages and no less than one page double-spaced) that will give the admissions committee a better understanding of the followings:
  - Why you are choosing this particular program of study
  - Your plans upon completion of the certificate
  - How your current work experience will enhance your experience in this program
- International students will need to meet university international student admissions guidelines, including TOEFL Program Requirements.

Required Courses

CIT 501	Foundations of Phytotherapy	3.0
CIT 502	Foundations of Complementary and Integrative Therapies	3.0
CIT 503	Holistic Living For The Caregiver	3.0
Select one of the following:		3.0
CIT 511	Spirituality, Health and Healing	
CIT 512	Body Movement Therapies	

CIT 513	Yoga for the Enlightened Practitioner
CIT 552	Integrative Advanced Relaxation Techniques (I-ART)
CIT 600	Foundations in Clinical Aromatherapy
CIT 602	Women's Integrative Health
CIT 617	Qigong: Bio-energy Therapy
CIT 618	Principles of Holistic Nursing
CIT 619	Principles of Bioenergy Therapies
CIT 620	Integrative Meditation: Where East Meets West
CIT 628	Special Topics in Complementary and Integrative Therapies
CIT 690	Independent Study
Total Credits	**12.0**

Additional Information

For more information about this program, contact:

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267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Complementary and Integrative Therapies (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Advanced-Study-Complementary-and-Integrative-Therapies) web page and Drexel University Online's Complementary and Integrative Therapies (http://www.drexel.com/online-degrees/nursing-degrees/cert-cit) web page.

Certificate of Advanced Study in Holistic Hospice and Palliative Care

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3306
Standard Occupational Classification (SOC) Code: 29-1199

The Certificate of Advanced Study in Holistic Hospice and Palliative Care provides students with a mind-body-spirit approach to end-of-life care. Graduates of the program develop mastery in providing compassionate spiritual care to patients and their families.

The use of Complementary and Integrative Therapies (CIT) within the scope of end-of-life care provides practitioners the tools needed to treat the holistic spectrum of the patient and their family, while integrating an effective and efficient delivery of care. The program's curriculum focuses on evidenced-based complementary and integrative therapy approaches that can be integrated within the framework of conventional healthcare practice.

Features and Benefits:

- This holistic program is driven by the principle of patient-centered care that provides compassionate and supportive integrative care to both the patient and their family.
- Courses are taught by internationally recognized leaders in Complementary and Integrative Therapies and faculty trained in both conventional healthcare and integrative therapies.
- Courses are offered wholly online in a highly dynamic learning format that engages students.

Admission Requirements:

- 2.75 GPA or above on all previous coursework
- A baccalaureate degree with a major in a health-related field from an accredited college or university
- Official transcripts from all universities or colleges attended
- A completed application form
- Nurse, nurse practitioner, physician assistants, and other healthcare professionals who hold licensure or a certificate: copy of license, eligibility for licensure, or certificate
- Current resume
- Two letters of recommendation
- Personal statement (no more than two pages and no less than one page double-spaced) that will give the admissions committee a better understanding of the followings:
  - Why you are choosing this particular program of study
  - Your plans upon completion of the certificate
  - How your current work experience will enhance your experience in this program
- International students will need to meet university international student admissions guidelines, including TOEFL Program Requirements.

Required Courses

CIT 503	Holistic Living For The Caregiver	3.0
CIT 621	Spirituality in Hospice and Palliative Care	3.0
CIT 622	Holistic Therapies in Hospice and Palliative Care	3.0
CIT 623	Cross Cultural Issues	3.0
Total Credits		**12.0**

Additional Information

For more information about this program, contact:

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Additional information is also available on the Drexel's College of Nursing and Health Professions Holistic Hospice and Palliative Care (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Advanced-Study-Holistic-Hospice-and-Palliative-Care) web page and Drexel University Online's Holistic Hospice and Palliative Care (http://www.drexel.com/online-degrees/nursing-degrees/cert-hospice) web page

Certificate of Advanced Study in Integrative Addiction Therapies

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3300
Standard Occupational Classification (SOC) Code: 29-1199

The Certificate of Advanced Study in Integrative Addiction Therapies prepares healthcare professionals to treat patients suffering from substance use disorders within the holistic spectrum by healing the body, mind, and spirit. Students will learn to integrate evidence-based complementary and integrative therapies (CIT) such as nutritional neuroscience, neurofeedback, meditation, auricular acupuncture, and Qigong bioenergy therapies within the framework of conventional healthcare. These integrative therapies will enable healthcare practitioners to incorporate innovative, caring and holistic methods to an underserved population.

Substance use disorders are among this country's most ubiquitous health and social issues. This cutting edge program is designed to empower practitioners to utilize complementary and integrative therapies within the scope of conventional healthcare practice to treat substance use disorders and enhance patient outcomes. It will provide practitioners the tools needed to treat the substance use disorder patient (and their family) within the holistic spectrum, healing body, mind and spirit.

A holistic, integrative treatment program for addiction requires combining neuronutritional treatment with other facets (bio, psycho, social, spiritual, economic), including counseling and education to support lifestyle change.

Features and Benefits:

- This ground-breaking Integrative Addiction Therapies program is the first program of its kind worldwide.
- It is the first program to offer future addiction healthcare professionals the skills needed to help their patients achieve health and recovery within the holistic spectrum healing mind, body and spirit, using natural and integrative methods.
- Courses are taught by internationally recognized leaders in Complementary and Integrative Therapies and distinguished psychotherapists in the field of Integrative Addiction Therapies.
- Courses are offered wholly online in a dynamic and interactive learning environment.

Admission Requirements:

- 2.75 GPA or above on all previous coursework
- A baccalaureate degree with a major in a health-related field from an accredited college or university
- Official transcripts from all universities or colleges attended
- A completed application form

- Nurse, nurse practitioner, physician assistants, and other healthcare professionals who hold licensure or a certificate: copy of license, eligibility for licensure, or certificate
- Current resume
- Two letters of recommendation
- Personal statement (no more than two pages and no less than one page double-spaced) that will give the admissions committee a better understanding of the followings:
  - Why you are choosing this particular program of study
  - Your plans upon completion of the certificate
  - How your current work experience will enhance your experience in this program
- International students will need to meet university international student admissions guidelines, including TOEFL Program Requirements.

Required courses

CIT 503	Holistic Living For The Caregiver	3.0
CIT 624	Foundations of Integrative Addiction Therapy	3.0
CIT 625	Spirituality, Empowerment, and Transformation	3.0
CIT 631	Introduction to Nutritional Neuroscience	3.0
Total Credits		**12.0**

Additional Information

For more information about this program, contact:

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Additional information is also available on the Drexel's College of Nursing and Health Professions Integrative Addiction Therapies (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Advanced-Study-Integrative-Addiction-Therapies) web page and Drexel University Online's Integrative Addiction Therapies (http://www.drexel.com/online-degrees/nursing-degrees/cert-asiat) web page

Certificate of Advanced Study in Women's Integrative Health

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.5822
Standard Occupational Classification (SOC) Code: 29-1199

The Certificate of Advanced Study in Women's Integrative Health provides healthcare professionals with a mind-body-spirit approach to care. Studies have shown that women desire a broader, integrative approach to their healthcare and share a philosophical congruence with Complementary and Integrative Health core values. In this program, students learn to integrate evidence-based complementary and integrative therapies such

as phytomedicine, nutrition, mind/body, and energy therapy modalities within the framework of conventional healthcare practice.

Integrative healthcare reaffirms the importance of the relationship between practitioner and patient, focuses on the whole person, and utilizes all appropriate therapeutic approaches, both conventional biomedicine and complementary and integrative health practices to achieve optimal health and healing. Women's Integrative Health provides a model of care that is most compatible and reflective of women's emotional and psychological needs in the health care relationship and prepares students to incorporate an innovative, caring and holistic spectrum of treatment. Students learn to explore the fullness of women's lives, taking into account a woman's beliefs, intuitions, and preferences for care which allows them to form a healing partnership, while providing their patients with the finest possible healthcare.

Features & Benefits:

- This pioneering program in Women's Integrative Health provides healthcare professionals evidenced based integrative treatment protocols that are holistic, addressing the mind, body, spirit complex that are inherently personalized and individualized.
- Courses are taught by leading Women's Integrative Health Practitioners and internationally-recognized experts in complementary and integrative therapies.
- Courses are offered entirely online in a dynamic and interactive learning environment.

Admission Requirements:

- 2.75 GPA or above on all previous coursework
- A baccalaureate degree with a major in a health-related field from an accredited college or university
- Official transcripts from all universities or colleges attended
- A completed application form
- Nurse, nurse practitioner, physician assistants, and other healthcare professionals who hold licensure or a certificate: copy of license, eligibility for licensure, or certificate
- Current resume
- Two letters of recommendation
- Personal statement (no more than two pages and no less than one page double-spaced) that will give the admissions committee a better understanding of the followings:
  - Why you are choosing this particular program of study
  - Your plans upon completion of the certificate
  - How your current work experience will enhance your experience in this program
- International students will need to meet university international student admissions guidelines, including TOEFL Program Requirements.

CIT 503	Holistic Living For The Caregiver	3.0
CIT 534	Witches, Wise Women and Women Healers	3.0
CIT 602	Women's Integrative Health	3.0
CIT 658	Advanced Women's Integrative Health	3.0
Total Credits		**12.0**

Additional Information

For more information about this program, contact:

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Additional information is also available on the Drexel's College of Nursing and Health Professions Women's Integrative Health (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Advanced-Study-Womens-Integrative-Health) web page and Drexel University Online's Women's Integrative Health (http://www.drexel.com/online-degrees/nursing-degrees/cert-aswih) web page

Couple and Family Therapy

Major: Couple and Family Therapy
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 82.0
Classification of Instructional Programs (CIP) code: 51.1505
Standard Occupational Classification (SOC) code: 21-1013

About the Program

The PhD program in Couple and Family Therapy (CFT) aims to develop the next generation of couple and family therapy scholars with a particular focus on research related to family based psychotherapy, families and health and health disparities. Students are trained to advance the knowledge base of couple and family therapy through education, research and clinical services with a particular emphasis on evidenced informed treatment modalities.

Graduates of the Couple and Family Therapy PhD program will serve as researchers in public and private institutions, faculty in graduate programs of couple and family therapy, psychology, social work or medical schools, and as clinicians in mental health agencies or private practice.

The PhD program in Couple and Family Therapy is rooted in relational and systems theories and therapies. Emphasis is on specialized training in couple and family therapy theories such as Attachment-based Family Therapy and Emotionally Focused Family Therapy and Medical Family Therapy approaches. Students are expected to demonstrate critical and analytical thinking with respect to the broad areas of systems theory and therapy, and have a primary interest in research and scholarship. The Couple and Family Therapy Department is committed to attracting minority scholars as well as training students to be aware and sensitive to contextual issues such as race, class, gender, spirituality and sexual orientation, as well as power and privilege.

For additional information about the PhD in Couple and Family Therapy, visit the program's Couple and Family Therapy (https://www.drexel.edu/cnhp/academics/doctoral/PHD-Couple-Family-Therapy) web site.

Degree Requirements

Students are required to complete the standard curriculum in couple and family therapy before pursuing the doctoral curriculum. The standard curriculum is offered in the COAMFTE- accredited Master of Family Therapy (p. 173) and Post-Master's Certificate programs at the University. A minimum of 82.0 post-master's quarter hours are required for the PhD program.

The curriculum includes study in the following areas:

- Theory and research in couple and family therapy
- Research methodology, including statistics, research design, and computer applications
- Specialized instruction in couple and family therapy
- Attachment-based Family Therapy, diverse family structures, Emotionally Focused Therapy and Medical Family Therapy, Forensic Family Therapy
- Supervised clinical experience
- Supervision of supervision

Required Courses

CFTP 713	Introduction to CFT Clinical Research	3.0
CFTP 729	Diverse Families and Communities: Intervention Strategies	3.0
CFTP 734	Supervision in Couple and Family Therapy	4.0
CFTP 735	Family Healthcare Policy	3.0
CFTP 751	Special Topics in Couple and Family Therapy	4.0-8.0
CFTP 757	Attachment, Emotions and Psychotherapy	3.0
CFTP 758	Dyadic Analysis and Longitudinal Causal Modeling in CFT	3.0
CFTP 759	Psychotherapy Outcome and Process Research	3.0
CFTP 760	Teaching Practicum	2.0
ARTS		
ARTS 714	Research Methods III: Qualitative Methods	3.0
NHP		
NHP 762	Health Professional Education	3.0
RSCH		
RSCH 770	Foundations in Research Methods	3.0
RSCH 813	Measurement Theory in Healthcare	3.0
RSCH 812	Interpretation of Data	3.0
RSCH 759	Foundations of Biostatistics	3.0
Clinical Training		10.0-11.0
Select Three of The Following Courses		
CFTP 753	Introduction to Emotionally Focused Therapy	
CFTP 754	Core Skills in Emotionally Focused Therapy	
CFTP 755	Introduction to Attachment-based Family Therapy	
CFTP 756	ABFT Core Skills Advanced Course	
Dissertation [*]		4.0-109.0
Complete Three Courses Below		
CFTP 801	Couple and Family Therapy Internship	
CFTP 802	Couple and Family Therapy Dissertation	
CFTP 803	Couple and Family Therapy Dissertation Defense	
Additional Course (Elective)		3.0
Students select an additional elective courses (Students may choose to go outside of the program to meet this requirement, provided each course is at least 4.0 credits and at the doctoral level of sophistication or they may select one of the following courses.)		
Total Credits		**56.0-130.0**

[*] Internship (course 801): Students are required to do at least three quarter of internship hours during the 4th year of the program. They have to sign up for nine credits per quarter to cover this activity. Most internships will be done in 3 quarters (27 credits) but we will set this expectation that the internship will be completed after 4 quarters (36 credits) to give the student some flexibility.
Dissertation (course 802): Students should begin their dissertation in year three of the program. We expect this project will take four quarters (36 credits). For each of those quarters the student has to sign up for 9 credits per quarter of 802. If the project takes longer than four quarters, the student can continue to sign up for nine credits of 802 each quarter. We anticipated however that all students will be done with their dissertation after 8 quarters (2 years or 72 credits).
Dissertation Defense (803): When a student is done with their dissertation they need to defend it. To sign up for defense, a student needs to pay for one credit of dissertation defense course.

Students must be actively engaged in clinical practice throughout the program. Before graduating from the PhD program, all students must have completed 1,000 hours of direct client contact equivalent to that which is offered in a COAMFTE accredited program. Any student who can document that his or her previous supervised clinical practice is comparable to that which would be received in a COAMFTE accredited program may petition the program to waive some or all of the required 1,000 direct client contact hours. Students must defend their dissertation prior to beginning internship.

Internship

All students are required to do an internship. Internship supervisors must be clearly senior in experience to the student intern. The purpose of the internship is to provide students with a supervised full-time clinical, research, academic or administrative experience of at least nine months duration. Clinical and alternate internships must emphasize relationally focused practice and research. For the clinical internship, it is to insure that students meet the 1,000 direct client contact hour standard.

Students should contact the Individual, Couple and Family Therapy Department (https://www.drexel.edu/cnhp/academics/departments/Couple-and-Family-Therapy) for additional information about the qualifying exam and the dissertation.

Couple and Family Therapy Faculty

Stephanie Brooks, PhD, LCSW, LMFT *(Drexel University) Department Chair and Director, Post-Master's & Medical Family Therapy Certificate Programs.* Associate Clinical Professor. Forensic family therapy, couple and family therapy supervision and training, person of the therapist, racism and stress and couples living with ADHD.

Maureen Davey, MFT, PhD, LMFT *(Syracuse University).* Associate Professor. Development of culturally sensitive family-based interventions for historically under-served populations.

Kenneth Hardy, PhD *(Florida State University).* Assistant Clinical Professor. Challenging society to think critically about the hidden but significant connections that often exist between trauma and issues of oppression.

Eric Johnson, PhD, MSW, MDiv *(Rutgers University).* Assistant Clinical Professor. Families of the mentally ill, forensic family therapy, post-divorce mediation.

Marlene F. Watson, PhD, LMFT *(Virginia Polytechnic and State University)*. Associate Professor. Forensic family therapy, siblings, race, class, gender and health policy issues.

Dance/Movement Therapy and Counseling

Major: Dance/Movement Therapy Counseling
Degree Awarded: Master of Arts (MA)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 51.2301
Standard Occupational Classification (SOC) code: 29-1129

About the Program

Dance/movement therapy (DMT) is a body/mind-integrated approach to mental health counseling, in which movement is an essential medium. In this two-year curriculum, student learn to effectively engage in therapy relationships that support the emotional, cognitive, social and physical integration and functioning of the clients with whom they will work.

The curriculum engages students in experiential and reflective learning processes as well as more traditional discussion, lecture, tutorial, and clinical education formats. Through a balance of classroom education and clinically supervised practicum and internship experiences, students develop a strong foundation for skilled DMT practice. Program coursework supports an understanding of human development, multicultural diversity, psychopathology, therapeutic change processes, and social systems. Students apply this understanding and observational skills based in Laban Movement Analysis (LMA) to assess client functioning and formulate therapy goals. Improvisational processes support the design of relevant movement and verbal therapy interventions in both individual and group therapy forms. The curriculum includes specialized approaches with adult and child clinical populations.

For additional information about the program, visit the College of Nursing and Health Professions' Dance/Movement Therapy (https://www.drexel.edu/cnhp/academics/graduate/MA-Dance-Movement-Therapy-Counseling) web site.

Degree Requirements

Core Courses

ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 504	Human Psychological Development I	2.0
ARTS 505	Clinical Diagnosis of Psychopathology I	2.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 507	Group Dynamics and Therapy	2.0
ARTS 508	Introduction to Behavioral Research I	2.0
ARTS 509	Human Psychological Development II	2.0
ARTS 513	Clinical Diagnosis of Psychopathology II	2.0
ARTS 515	Introduction to Behavioral Research II	2.0
ARTS 601	Theories of Psychotherapy I	2.0
ARTS 602	Multicultural Perspectives in Therapy I	2.0
ARTS 603	Clinical Appraisal and Assessment I	2.0
ARTS 604	Career Counseling	4.0
ARTS 605	Theories of Psychotherapy II	2.0
ARTS 606	Professional Orientation and Ethics II	3.0
ARTS 607	Clinical Appraisal and Assessment II	2.0

Dance/Movement Therapy Track Courses

ARTS 519	Neuroscience: Concepts and Applications for Creative Arts Therapy	3.0
ARTS 552	Therapy Relationship Skills I	2.0
ARTS 553	Therapy Relationship Skills II	2.0
ARTS 554	Movement Observation I	2.0
ARTS 555	Laban Movement Analysis Lab	1.0
ARTS 556	Movement Observation II	2.0
ARTS 557	Dance/Movement Therapy Theory and Practice - Children I	2.0
ARTS 558	Dance/Movement Therapy Theory and Practice - Children II	2.0
ARTS 559	Introduction to Dance/Movement Therapy History and Literature	1.0
ARTS 563	Movement Perspectives in Human Development	2.0
ARTS 564	Group Dynamics and Therapy II: Dance/Movement Therapy	2.0
ARTS 654	Dance/Movement Therapy Theory and Practice III: Adults	2.0
ARTS 655	Multicultural Perspectives in Therapy II: Dance/Movement Therapy	2.0
ARTS 656	Mental Health Applications of Movement Analysis I	2.0
ARTS 657	Mental Health Applications of Movement Analysis II	2.0
ARTS 661	Family Dance/Movement Therapy: A Systems Approach	2.0
ARTS 662	Advanced Group Dance/Movement Therapy Skills I	2.0
ARTS 663	Advanced Group Dance/Movement Therapy Skills II	2.0

Clinical Education Courses

ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 511	Clinical Practicum II	1.0
ARTS 512	Clinical Practicum III	1.0
ARTS 610	Clinical Internship I	3.0
ARTS 611	Clinical Internship II	3.0
ARTS 612	Clinical Internship III	3.0
ARTS 658	Dance/Movement Therapy Advanced Group Supervision I	1.0
ARTS 659	Dance/Movement Therapy Advanced Group Supervision II	1.0
ARTS 660	Dance/Movement Therapy Advanced Group Supervision III	1.0

Thesis

ARTS 621	Thesis I	1.0
ARTS 622	Thesis II	1.0
ARTS 623	Thesis III	1.0
ARTS 624	Thesis IV	1.0

Electives [*]

Select one of the following:

ARTS 551	Introduction to Anatomy and Kinesiology for Dance/Movement Therapy	
ARTS 651	Medical Dance/Movement Therapy	
ARTS 652	The Kestenberg Movement Profile	

Additional Electives [*]

As needed, in consultation with the program director students can select the following electives:

ARTS 625	For Thesis Only	
ARTS 699	Independent Study in Creative Arts Therapy	
Total Credits		**90.0**

Sample Plan of Study

Term 1		Credits
ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 504	Human Psychological Development I	2.0
ARTS 505	Clinical Diagnosis of Psychopathology I	2.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 552	Therapy Relationship Skills I	2.0
ARTS 554	Movement Observation I	2.0
ARTS 559	Introduction to Dance/Movement Therapy History and Literature	1.0
ARTS 563	Movement Perspectives in Human Development	2.0
Elective[*]		
ARTS 551	Introduction to Anatomy and Kinesiology for Dance/Movement Therapy	
	Term Credits	**15.0**
Term 2		
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 507	Group Dynamics and Therapy	2.0
ARTS 508	Introduction to Behavioral Research I	2.0
ARTS 511	Clinical Practicum II	1.0
ARTS 513	Clinical Diagnosis of Psychopathology II	2.0
ARTS 553	Therapy Relationship Skills II	2.0
ARTS 557	Dance/Movement Therapy Theory and Practice - Children I	2.0
ARTS 556	Movement Observation II	2.0
	Term Credits	**15.0**
Term 3		
ARTS 509	Human Psychological Development II	2.0
ARTS 512	Clinical Practicum III	1.0
ARTS 515	Introduction to Behavioral Research II	2.0
ARTS 555	Laban Movement Analysis Lab	1.0
ARTS 558	Dance/Movement Therapy Theory and Practice - Children II	2.0
ARTS 564	Group Dynamics and Therapy II: Dance/Movement Therapy	2.0
NEUR 534	Neuroscience	3.0
	Term Credits	**13.0**
Term 4		
ARTS 604	Career Counseling	4.0
ARTS 621	Thesis I	1.0
	Term Credits	**5.0**
Term 5		
ARTS 601	Theories of Psychotherapy I	2.0

ARTS 602	Multicultural Perspectives in Therapy I	2.0
ARTS 610	Clinical Internship I	3.0
ARTS 622	Thesis II	1.0
ARTS 654	Dance/Movement Therapy Theory and Practice III: Adults	2.0
ARTS 656	Mental Health Applications of Movement Analysis I	2.0
ARTS 658	Dance/Movement Therapy Advanced Group Supervision I	1.0
Elective[*]		
ARTS 651	Medical Dance/Movement Therapy	
ARTS 652	The Kestenberg Movement Profile	
	Term Credits	**13.0**
Term 6		
ARTS 603	Clinical Appraisal and Assessment I	2.0
ARTS 605	Theories of Psychotherapy II	2.0
ARTS 611	Clinical Internship II	3.0
ARTS 623	Thesis III	1.0
ARTS 657	Mental Health Applications of Movement Analysis II	2.0
ARTS 659	Dance/Movement Therapy Advanced Group Supervision II	1.0
ARTS 662	Advanced Group Dance/Movement Therapy Skills I	2.0
	Term Credits	**13.0**
Term 7		
ARTS 606	Professional Orientation and Ethics II	3.0
ARTS 607	Clinical Appraisal and Assessment II	2.0
ARTS 612	Clinical Internship III	3.0
ARTS 624	Thesis IV	1.0
ARTS 655	Multicultural Perspectives in Therapy II: Dance/Movement Therapy	2.0
ARTS 660	Dance/Movement Therapy Advanced Group Supervision III	1.0
ARTS 661	Family Dance/Movement Therapy: A Systems Approach	2.0
ARTS 663	Advanced Group Dance/Movement Therapy Skills II	2.0
	Term Credits	**16.0**

Total Credit: 90.0

[*] Please note that the electives are in addition to the 90 credits required for the degree. Please consult with you advisor before registering for an elective.

Creative Arts Therapies Department Faculty

Yasmine Awais, ATR-BC, ATCS, LCAT *(Art Institute of Chicago)*. Assistant Clinical Professor. Multicultural art therapy, clinical supervision.

Joke Bradt, PhD, MT-BC *(Temple University)*. Associate Professor. Research in music therapy, chronic pain, systematic reviews.

Gayle Gates, MA, BC-DMT *(Immaculate Heart College, CA) Associate Director, Dance/Movement Therapy Programs*. Assistant Clinical Professor. Early childhood development and mother-child interaction, intervention with at risk preschoolers.

Nancy Gerber, PhD, ATR-BC, LPC *(Union Institute and University) Director, PhD Program in Creative Arts Therapies.* Associate Clinical Professor. Art therapy assessment; treatment of adolescents, adults and geriatrics, modern psychoanalysis and art therapy, arts therapy education, doctoral education.

Sharon W. Goodill, PhD, BC-DMT, NCC, LPC *(Union Institute and University) Chair, Department of Creative Arts Therapies.* Clinical Professor. Dance/movement therapy for medically ill patients, mind/body studies, CAT research and leadership.

Florence Ierardi, MM, MT-BC, LPC *(Temple University) Director of Field Education.* Associate Clinical Professor. Effects of percussion playing on the nervous system; rhythm-based assessment models.

Girija Kaimal, EdD, MA *(Harvard University).* Assistant Professor. Art therapy, educational research, program evaluation, art therapy.

Donna H. Kaiser, PhD, ATR-BC, LPC, LMFT *(The College of William and Mary) Director of Art Therapy Programs.* Associate Clinical Professor. Art therapy research, art therapy with clients with substance abuse diagnoses; development of an art therapy assessment for evaluating attachment security.

Paul Nolan, MCAT, MT-BC, LPC *(Hahnemann Medical College) Director of Music Therapy Programs.* Associate Clinical Professor. Music and child development, outcome studies in music therapy; analysis of musical behaviors in music therapy; psychological responses to music therapy.

Ellen Schelly-Hill, MMT, BA *(Antioch NE Graduate School) Director of Dance/Movement Therapy Programs.* Associate Clinical Professor. Adults diagnosed with mood disorders, anxiety, and chronic pain; creative arts in therapy for at-risk adolescents.

Rehabilitation Sciences

Major: Rehabilitation Sciences
Degree Awarded: Doctor of Health Science (DHSc)
Calendar Type: Quarter
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 51.2308
Standard Occupational Classification (SOC) code: 29-1123

About the Program

The Doctor of Health Science (DHSc) in Rehabilitation Sciences program is designed to be an advanced doctoral degree program open to physical and occupational therapists seeking leadership roles in education and/ or clinical practice. The mission of the program is to prepare these individuals to take leadership roles as educators and master clinicians in rehabilitation sciences and to promote transfer of knowledge, evidence-based practice, professional responsibility, and lifelong learning across a variety of academic and clinical settings. The curriculum includes foundation courses in the health professions, teaching, research, and the opportunity for focused study in a specialized area of clinical practice such as pediatrics, orthopedics and hand rehabilitation.

Program Delivery

Coursework is predominantly online, with onsite components arranged on preset week days or weekends during the curriculum. Most of the coursework will be offered without pre- or co-requisites to maximize students' ability to balance their work and personal lives while completing the degree. Each student chooses an area of practice that matches the

expertise of one of our faculty members; an arrangement that ensures optimal mentorship for the students.

Goals and Objectives

The objectives of the DHSc program include four areas: leadership, education, scholarship, and clinical health care practice. Graduates of the Doctor of Health Science in Rehabilitation Sciences program will be prepared to:

- Practice as a master clinician in an area of advanced practice through clinical decision-making that is consistent with concepts of client-centered care and current best evidence.
- Synthesize theory, research, and health care policy relevant to individuals with movement dysfunction to promote transfer of knowledge into clinical practice.
- Serve effectively as consultants to patients, clients, community organizations, and professional colleagues.
- Serve effectively as educators in rehabilitation sciences in the academic, clinical, and community settings.
- Develop and evaluate structure, tests and measures, process, and outcomes of service delivery and/or intervention through scholarship in an area of advanced practice or education.
- Communicate information effectively through peer-reviewed professional presentations publications.

Additional Information

For more information, visit the Department of Physical Therapy and Rehabilitation Sciences (https://www.drexel.edu/cnhp/academics/departments/Physical-Therapy) web page.

Admission Requirements

Applicants must possess a master's or clinical doctoral professional degree in physical therapy or a related field such as MPT, MSPT, MOT, DPT, or OTD or some other master's degree for admission consideration. In addition applicants must have a current, active US or Canadian license to practice their discipline. Applicants would complete a standard graduate application including submission of the following:

- Copy of professional license
- College/university transcripts with minimal overall GPA of 3.0
- GRE scores
- Two letters of recommendation from advisors, supervisors, professors, or mentors
- CV
- Personal statement outlining career plan and topic of research interest

Degree Requirements

Foundation Courses

NHP 680	Informatics in the Health Professions	2.0
NHP 766	Health Promotion, Fitness and Wellness	2.0
NHP 767	Leadership & Professional Issues	2.0
RSCH 758	Application of Evidence to Practice	2.0
Teaching Courses		
NHP 762	Health Professional Education	3.0
RHAB 760	Academia for Rehabilitation Scientists	1.0
RHAB 824	Teaching Practicum I	1.0
RHAB 825	Teaching Practicum II	2.0

Research Courses

NHP 810	Biostatistical Applications	2.0
RSCH 759	Foundations of Biostatistics	3.0
or RSCH 519	Introduction to Biostatistics	
RSCH 770	Foundations in Research Methods	3.0
RSCH 813	Measurement Theory in Healthcare	3.0
Clinical Specialization Courses		12.0
PTRS 740	Issues in Pediatric Health & Rehabilitation	
PTRS 760	Pediatric Decision Making	
PTRS 761	Pediatric Clinical Application	
PTRS 765	Spinal Rehabilitation	
PTRS 766	Extremity Rehabilitation	
PTRS 768	Upper Quarter Joint Pathology	
PTRS 769	Nerve Injuries of the Upper Quarter	
PTRS 770	Diseases That Affect the Hand	
PTRS 772	Selected Topics in Pediatrics	
PTRS 780	Foundations of School-based Practice	
PTRS 781	Advanced Competencies in School-based Practice	
Practicum Experience		3.0
RHAB 819	Advanced Clinical Practicum	
RHAB 823	Research Practicum	
RHAB 826	Teaching Practicum III	
RHAB 832	Leadership Practicum	
Elective		3.0
PTRS 610	Issues in Pharmacotherapy	
PTRS 651	Applied Tissue Biomechanics	
RHAB 815	Scientific Inquiry and Writing	
RHAB 820	Independent Study	
Clinical Dissertation Courses [*]		
RHAB 818	Clinical Question Development	1.0
RHAB 827	Clinical Dissertation Research I	1.0
RHAB 828	Clinical Dissertation Research II	1.0
RHAB 829	Clinical Dissertation Research III	1.0
Total Credits		**48.0**

[*]   Students must successfully complete comprehensive examination prior to enrolling in the Clinical Dissertation series

Facilities

Teaching Facilities

The primary teaching resource for this program is supported distance learning technology. Instructional materials are provided through text, graphics, audio and video formats and are available online through a course management system 24 hours a day. The online courses are highly interactive through the use of web discussion boards, audio chat tools, and video conferencing. Program faculty share a belief that it is important to fully support distance learning students, and support will be offered via email, telephone, fax, and video-conferencing. The College of Nursing and Health Professions invests in state-of-the-art technology to foster an effective teaching and learning environment. The onsite portions of the program are held on the Center City (Health Sciences) Campus of Drexel University. The Department of Physical Therapy and Rehabilitation Sciences has two state-of-the-art dedicated teaching laboratories.

Research Facilities

The department's research facilities include over 9,000 square feet of well-equipped research laboratory space (Biomechanics, Gait, Pediatrics, and Neuromuscular Performance Labs), with equipment including force plates, EMG, motion analysis and human performance measurement equipment. This space includes conference rooms, PhD and post doc offices and is located next door to the College's 14,000 square feet, multi-disciplinary clinical practice.

The Department of Physical Therapy and Rehabilitation also values community partners as a central part of the research resources. Many faculty and students are involved in community-based research through collaborations with CanChild Centre, 11th Street Family Health Center, and numerous pediatric hospitals, out-patient facilities, and early intervention providers. Faculty are collaborating on research projects with nationally and internationally known researchers on several multi-site funded projects.

Physical Therapy and Rehabilitation Sciences Faculty

Maria Benedetto, DPT *(University of Puerto Rico; Columbia University)*. Associate Clinical Professor. Motor learning and motor control in pediatrics; timed ambulation; obstacle course for children with and without motor disabilities.

Lisa Ann Chiarello, PT, PhD, PCS *(Hahnemann University; Ithaca College) Director, PhD Program*. Professor. Models of service delivery in early intervention; parent-child relationship and the use of play; family-centered care.

David Ebaugh, PT, PhD *(Drexel University)*. Assistant Professor. Quantitative analysis of movement in patients with shoulder pathology; differential diagnosis of shoulder problems; orthopedic examinations and interventions.

Jane Fedorczyk, PT, PhD, CHT, ATC *(Beaver College) Director, Post-Professional Clinical Programs*. Associate Clinical Professor. Hand and upper extremity injuries related to repetitive movement including tendinopathies and nerve compression syndromes.

Kevin E. Gard, DPT, OCS *(Temple University) Vice-Chair, Department of Physical Therapy and Rehabilitation Sciences and Director, Professional Doctor of Physical Therapy Program*. Associate Clinical Professor. Orthopedics; sports medicine.

Noel Goodstadt, DPT, OCS, CSCS *(Pennsylvania State University; Hahnemann University; Temple University)*. Assistant Clinical Professor. Orthopedics, musculoskeletal disorders.

Jan Meiers, PT, DPT, GCS *(Temple University) Assistant Director of Clinical Education*. Assistant Clinical Professor. Wellness in the geriatric population.

Kathryn D. Mitchell, PT, DPT, NCS *(Temple University) Assistant Director of Clinical Education*. Assistant Clinical Professor. Adult neuromuscular rehabilitation, vestibular rehabilitation, and balance and falls; clinical health informatics.

Margaret O'Neil, PT, PhD, MPH *(MCP Hahnemann University; Duke University; University of North Carolina at Chapel Hill)*. Associate Professor. Measurement of and interventions to improve physical activity and fitness levels and promote participation in children and youth with

who are overweight/obese and those with physical disabilities (especially cerebral palsy).

Margo Orlin, PT, PhD *(Drexel University) Interim Chair, Department of Physical Therapy and Rehabilitation Sciences.* Associate Professor. Gait and function in children with developmental disabilities, evaluation of musculoskeletal interventions for children with cerebral palsy; enhancing participation for children and adolescents with cerebral palsy.

Robert J. Palisano, PT, ScD, FAPTA *(Boston University).* Professor. Motor function of children with cerebral palsy, mobility and self-care in children and adolescents with cerebral palsy, evaluation of therapy services in early intervention, outcomes measurement.

Deborah Rose, PT, DPT, PCS *(Drexel University).* Adjunct Instructor. Pediatric clinical specialist.

Patricia Rubertone, MSW, MPT *(Temple University; Hahnemann University) Director of Clinical Education.* Assistant Clinical Professor. Student learning; course design.

Patricia A. Shewokis, PhD *(University of Georgia).* Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalograpy (EEG) and methodology and research design.

Sheri Silfies, PT, PhD *(MCP Hahnemann University) Research Lab Coordinator.* Associate Professor. Identification and treatment of impairments in neuromuscular control of trunk mobility and postural stability in patients with low back pain; focusing on mechanism of recurrent low back pain.

Susan Smith, PT, PhD *(University of Connecticut, Texas Woman's University) Associate Dean for Research and Health Professions, Graduate Education, CNHP.* Associate Professor. Health promotion and interventions for manifestations of low bone mass in women; quantitative evaluation and interventions in orthopedic physical therapy with an emphasis on spinal pain and dysfunction.

Sarah Wenger, PT, DPT, OCS *(Arcadia University; Temple University) Coordinator of Experiential Learning.* Assistant Clinical Professor. Health, wellness and fitness, models for preventative physical therapy.

Interdepartmental Faculty

Joseph A. Rubertone, MPT, PhD *(West Virginia University).* Associate Clinical Professor. Connectivity of vestibular nuclear complex, brain tumor imaging, and clinical studies pertaining to the effectiveness of stroke rehabilitation.

Doctor of Nursing Practice

Major: Nursing Practice
Degree Awarded: Doctor of Nursing Practice (DNP)
Calendar Type: Quarter
Total Credit Hours: 46.0
Classification of Instructional Programs (CIP) code: 51.3818
Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Doctor of Nursing Practice (DNP) at Drexel University is designed for nurses seeking a terminal degree in nursing practice and offers an alternative to research-focused doctoral programs. The mission of the

DNP program is to prepare individuals to assume leadership roles as executives or practitioners and to apply evidence-based practice to improve individual, family, and community health outcomes.

Nurses graduating in Drexel's DNP program are well-equipped to fully implement the science developed by nurse researchers in PhD, DNSc, and other research-focused nursing doctorates.

Program Objectives

The objectives are focused in two areas: leadership in an executive role and a practitioner role. Graduates of the DNP degree will be prepared to:

1. Evaluate patient care delivery approaches to meet the current and anticipated needs of patient populations based on outcomes and scientific findings.
2. Translate research into clinical practice and policy to improve care and outcomes.
3. Use advanced communication skills - to lead quality improvement and patient safety.
4. Use principles of business, finance, economics, and health policy to develop and implement plans to improve the quality of healthcare delivery.
5. Demonstrate sensitivity to diversity in patients and providers.
6. Evaluate effective strategies for the management of ethical dilemmas that can occur in the course of healthcare delivery.

Admission Requirements

Applicants must have a bachelor of science in nursing or advanced practice masters' degree in nursing. In addition, applicants must have a current, active US license to practice nursing. Applicants would complete a standard graduate application including submission of the following:

- Copy of professional license, advanced certificate(s) and advanced practice license(s)
- University/college transcripts (except for graduates of Drexel)
- Two letters of recommendation from advisors, supervisors, professors or mentors
- CV
- Personal statement on reasons for their interest in the DNP and career plan

Degree Requirements

Curriculum

The sequence of the doctoral program of study is organized to integrate the core courses while at the same time prepare students for immersion in research courses. The clinical and role practica provide students with opportunity to enhance their leadership skills in clinical practice and executive roles in service delivery.

The program offers two tracks:

- **The Practitioner Track:** for the student who wants to remain in clinical practice post-graduation.
- **The Executive Track:** for graduates who want careers in executive nursing and health care management, but who still prefer a nursing doctorate with a connection to clinical practice.

Required Courses

NURS 703	Health Policy and Economics	3.0
NURS 706	Applied Epidemiology	3.0
NURS 713	Human Responses to Altered Function in Health and Illness	3.0
NURS 716	Scientific Foundation of Nursing Knowledge Development	3.0
NURS 718	Quantitative Methods for Practice-based Nursing Inquiry	3.0
NURS 719	Leadership in Organizations and Systems	3.0
NURS 720	Health Information Technology and Information Systems	3.0
NURS 819	Qualitative Methods in Clinical Nursing	3.0
NURS 830	Doctoral Nursing Practice Clinical Practicum	3.0
NURS 835	Doctoral Nursing Practice Role Practicum	3.0
NURS 836	Clinical and Applied Nursing Ethics	3.0
NURS 837	Translating Evidence into Clinical Practice	3.0
NURS 840	DNP Project Seminar	3.0
NURS 841	DNP Project Advisement	1.0
NURS 891	Doctoral Nursing Special Topics for the Nurse Executive	3.0
or NURS 892	Doctoral Nursing Special Topics for the Nurse Practitioner	
RSCH 519	Introduction to Biostatistics	3.0
Total Credits		**46.0**

Program Delivery

The DNP program is an online program that includes program orientation and didactic instructions on information and technology and a residency requirement. The program orientation and didactic instructions on information and technology occurs before the fall session.

The residency requirement occurs during the first year summer session when the student is enrolled in 2 didactic courses on campus. The student is expected to develop and implement a DNP project. The student may defend his or her DNP project proposal online. During the defense, the student will demonstrate effective verbal communication skills and knowledge in the area of interest to the academic committee (2 faculty selected by the student in collaboration with his or her advisor) and finalize plans for implementation of the DNP project. The last on-site visit will be the oral defense of the DNP project that denotes the culmination of the degree program.

Sample Plan of Study

First Year

Fall

		Credits
RSCH 519	Introduction to Biostatistics	3.0
NURS 716	Scientific Foundation of Nursing Knowledge Development	3.0
	Term Credits	**6.0**

Winter

NURS 706	Applied Epidemiology	3.0

NURS 713	Human Responses to Altered Function in Health and Illness	3.0
	Term Credits	**6.0**

Spring

NURS 718	Quantitative Methods for Practice-based Nursing Inquiry	3.0
NURS 819	Qualitative Methods in Clinical Nursing	3.0
	Term Credits	**6.0**

Summer

NURS 720	Health Information Technology and Information Systems	3.0
NURS 719	Leadership in Organizations and Systems	3.0
	Term Credits	**6.0**

Second Year

Fall

NURS 830	Doctoral Nursing Practice Clinical Practicum	3.0
NURS 703	Health Policy and Economics	3.0
	Term Credits	**6.0**

Winter

NURS 835	Doctoral Nursing Practice Role Practicum	3.0
NURS 836	Clinical and Applied Nursing Ethics	3.0
	Term Credits	**6.0**

Spring

NURS 837	Translating Evidence into Clinical Practice	3.0
NURS 891 or 892	Doctoral Nursing Special Topics for the Nurse Executive Doctoral Nursing Special Topics for the Nurse Practitioner	3.0
	Term Credits	**6.0**

Summer

NURS 840	DNP Project Seminar	3.0
	Term Credits	**3.0**

Third Year

Fall

NURS 841[*]	DNP Project Advisement	1.0
	Term Credits	**1.0**

Total Credit: 46.0

[*] Continue as necessary.

Interdepartmental Faculty

Barbara Amendolia, DrNP, NNP, APN-BC *(Drexel University)*. Assistant Clinical Professor. Neonatology, specifically feeding difficulties and respiratory diseases of the newborn.

Katherine Kaby Anselmi, PhD, JD, CRNP *(University of Pennsylvania) Assistant Dean of Accreditation/Regulatory Affairs & Online Innovation*. Associate Clinical Professor. Nursing, law, family nurse practitioner, women's health nurse practitioner.

Joan Rosen Bloch, PhD, CRNP *(University of Pennsylvania)*. Associate Professor. Maternal and infant health outcomes with a particular focus on racial and ethnic perinatal health disparities.

Kathleen Fisher, PhD, CRNP *(Pennsylvania State University)*. Associate Clinical Professor. Health care for vulnerable populations, decision making in vulnerable populations (i.e. individuals with intellectual disability.)

Sandra A. Friedman, MSN, CNM *(Yale University)*. Assistant Clinical Professor. Interdisciplinary team simulation and debriefing, health assessment and health promotion, nurse midwifery with specialty in adolescent health, nurse managed health center administration.

Ellen Giarelli, EdD, CRNP *(University of Pennsylvania; Rutgers University) Director of Post-baccalaureate Certificate Program in the Integrated Nusing Care of Autism Spectrum Disorder*. Associate Professor. Genetic/genomic nursing care, self-management of chronic disorders, autism spectrum disorder.

Elizabeth Gonzalez, PhD, PMHCNS-BC *(New York University) Department Chair, Doctoral Nursing Program* . Associate Clinical Professor. Chronic stress, geropsychiatry, depression among the elderly, minority health issues and cross-cultural research among family caregivers of relatives with Alzheimer`s disease.

Thomas L. Hardie, EdD, RN, PMHCNS-BC *(Columbia University, Teachers College)*. Associate Professor. Psychiatric nursing, cancer survivorship, treatment research outcomes in substance abuse

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania)*. Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Al Rundio, Jr., PhD, DNP, RN, APRN, NEA, BC *(University of Pennsylvania) Interim Associate Dean for Advanced Practice Nursing Programs, Chair of DNP Program*. Clinical Professor. Nursing graduate leadership and management track.

Roberta Waite, EdD, MSN *(Widener University; University of Pennsylvania) Assistant Dean of Academic Integration and Evaluation of Community Programs*. Associate Professor. Psychiatric nursing; depression and ADHD in minority adults, and the effects of adverse childhood experiences on adult health in minority adults.

Doctor of Physical Therapy

Major: Physical Therapy
Degree Awarded: Doctor of Physical Therapy (DPT)
Calendar Type: Quarter
Total Credit Hours: 128.0
Classification of Instructional Programs (CIP) code: 51.2308
Standard Occupational Classification (SOC) code: 29-1123

About the Program

The Doctor of Physical Therapy (DPT) curriculum produces broadly educated physical therapists, while being sensitive to the needs of the health care community and the students' interests. The program strives to foster both intellectual and professional growth in students and is reflective of contemporary practice to prepare graduates for the ongoing changes in health care delivery.

The Doctor of Physical Therapy (DPT) program prepares students for autonomous practice in physical therapy. As a science, physical therapy examines human motion at the tissue, organ, and systems levels. In the clinical environment, physical therapists (PTs) examine and evaluate patients/clients and implement procedural interventions that restore physical function for all people across the life span. As essential practitioners in the health care delivery system, PTs assume roles in rehabilitation services, prevention and health maintenance programs, and professional and community programs. As professional members of the health care team, PTs supervise support personnel, serve as consultants to other health care personnel, serve as consultants to families and caregivers, participate in administrative services, and conduct clinical research. PTs also serve as advocates for health policy and standards of care that help ensure optimum care for their patients/clients.

Graduates of the Doctor of Physical Therapy program are prepared to fulfill their professional obligations, provide leadership to the profession, and use their knowledge and skills to contribute to the health care of society.

The 31-month curriculum spans ten academic quarters and consists of integrated didactic and clinical study with an emphasis on adult learning methodology. The curriculum consists of foundational courses during the first year, with subsequent quarters sequenced to progress through the hierarchy of educational objectives from simple to complex. All didactic material is organized for synthesis and application to professional practice.

For more information visit the Physical Therapy and Rehabilitation Science (https://www.drexel.edu/cnhp/academics/doctoral/DPT-Doctor-Physical-Therapy) page on the College of Nursing and Health Professions website.

For application instructions, visit the Drexel's Graduate Admission web page for the Doctor of Physical Therapy (http://drexel.edu/grad/programs/cnhp/professional-doctor-of-physical-therapy).

Degree Requirements

The DPT curriculum occurs in a 10-week quarter format over ten quarters: fall, winter, spring, and summer I; fall, winter, spring, and summer II; and fall and winter III. Classes begin in late September for first-year students. The curriculum is subject to modification.

First Year

Fall		Credits
PTRS 530	Kinesiology I	4.0
PTRS 534	Physical Therapy Exam Intervention I	3.0
PTRS 532	Human Gross Anatomy I	4.0
PTRS 537	Clinical Correlations I	3.0
PTRS 633	Professional Development	1.0
PTRS 613	Clinical Practice I	0.5
	Term Credits	**15.5**
Winter		
PTRS 533	Human Gross Anatomy II	3.5
PTRS 531	Kinesiology II	3.0
PTRS 535	Physical Therapy Exam Intervention II	3.0
PTRS 539	Topics in Pathophysiology I	3.5
PTRS 624	Functional Modality	2.5
PTRS 614	Clinical Practice II	0.5
PTRS 751	Evidence-Based Practice	2.0
	Term Credits	**18.0**
Spring		
NEUR 507	Neuroscience I	3.0

PTRS 620	Orthopedic Physical Therapy: Upper Extremity	4.0
PTRS 623	Physical Agents	4.0
PTRS 540	Topics in Pathophysiology II	2.0
PTRS 639	Motor Learning	2.5
PTRS 615	Clinical Practice III	0.5
	Term Credits	**16.0**
Summer		
NEUR 508	Neuroscience II	2.0
PTRS 621	Orthopedic Physical Therapy: Lower Extremity	4.0
PTRS 627	Cardiopulmonary Physical Therapy I	4.0
PTRS 641	Neurological Exam and Intervention I	4.0
PTRS 646	Orthosis Management	1.5
PTRS 616	Clinical Practice IV	0.5
	Term Credits	**16.0**
Second Year		
Fall		
PTRS 652	Life Span Development I	3.0
PTRS 634	Health Professional Roles	3.0
PTRS 644	Wound Care Management	1.5
PTRS 645	Prosthesis Management	1.5
PTRS 752	Research and Measurement in Physical Therapy	2.0
PTRS 774	Clinical Education Seminar	0.5
PTRS 775	Clinical Education I	1.0
	Term Credits	**12.5**
Winter		
PTRS 622	Orthopedic Physical Therapy: Spine	4.0
PTRS 628	Cardiopulmonary Physical Therapy II	4.0
PTRS 637	Professional Project I	1.0
PTRS 642	Neurological Exam and Intervention II	5.0
PTRS 656	Motor Control and Rehabilitation	2.0
	Term Credits	**16.0**
Spring		
PTRS 776	Clinical Education II	2.0
PTRS 610[*]	Issues in Pharmacotherapy	3.0
	Term Credits	**5.0**
Summer		
PTRS 538	Clinical Correlations II	3.0
PTRS 632	Pediatric Physical Therapy	5.5
PTRS 643	Applied Biomechanics	3.0
PTRS 653	Life Span Development II	2.0
PTRS 654	Topics in Health Policy Services	2.0
PTRS 753	Evaluation of Research in Physical Therapy	4.0
	Term Credits	**19.5**
Third Year		
Fall		
PTRS 777	Clinical Education III	2.0
PTRS 655[*]	Health Administration	2.5
	Term Credits	**4.5**
Winter		
PTRS 778	Clinical Internship	3.0

| PTRS 647 | Professional Project II | 2.0 |
| | **Term Credits** | **5.0** |

Total Credit: 128.0

* Conducted online.

Clinical Education

A strong history of comprehensive clinical education exists for our professional students. The clinical education for the DPT program is integrated into the didactic portions of the curriculum so that knowledge obtained in the classroom is readily put into practice. The DPT program has contracts with hundreds of clinical sites across the nation, representing all facets of professional practice. Students are required to complete four clinical education experiences that offer various levels of acuity in different clinical environments. The first clinical education experience is 6 weeks in length, clinical education II and III are 10 weeks long, and the fourth experience, the clinical internship, is 12 weeks.

Students may select from clinical sites that offer experiences in pediatrics, adult rehabilitation, geriatrics, orthopedics, sports medicine, and industrial and occupational rehabilitation.

For more information visit the Physical Therapy and Rehabilitation Sciences Overview (https://www.drexel.edu/cnhp/academics/doctoral/DPT-Doctor-Physical-Therapy) page on the College of Nursing and Health Professions web site.

Facilities

Teaching Facilities

Most classes are held in lecture halls, classrooms, or laboratories on the Center City (Health Sciences) Campus of Drexel University. The entire campus has wireless capability for easy internet access. The Department of Physical Therapy and Rehabilitation Sciences has two state-of-the-art dedicated laboratories where the clinical components of the professional curriculum are taught. In these laboratories equipment reflects current physical therapy practice and is part of a multi-disciplinary clinical learning and resource center. Included as part of the resource center is a standardized patient lab that utilizes paid actors to simulate various clinical situations while students' interactions with those "patients" are monitored by supervising faculty. This center provides a rich environment for student learning.

Our teaching resources also include supported distance learning technology. Instructional materials are provided through text, graphics, audio and video formats and are available online through a course management system 24 hours a day. Our online courses are highly interactive through the use of web discussion boards and audio chat tools.

Additionally, the Professional DPT program uses its own faculty-staffed clinical sites as well as various clinical sites in the area to enhance the educational experience of the student. The department operates outpatient physical therapy sites in the Drexel Recreation Center on the University City campus, as part of the multidisciplinary Parkway Health and Wellness Center on the Center City campus and a pro-bono practice in the 11th Street Family Health Center. Students rotate through these facilities getting individualized mentoring while connecting classroom content with clinical practice. These experiences are in addition to the 38 weeks of clinical education the student will experience throughout the curriculum.

Research Facilities

The Department conducts hypothesis-driven research in human movement, biomechanics, motor control, community-based practice and family-centered care. Some of this research is conducted in a 23,000 square foot multidisciplinary center on the Center City Campus. The center has a gait and motion analysis lab containing a video-based motion analysis system with in-floor force plates, and neuromuscular performance labs equipped with custom-built force measuring systems, l6-channel EMG system and electromagnetic tracking systems. Other research is conducted via partnerships with organizations locally, nationally, and internationally. Other departments involved in the research center include Nutrition Sciences and Nursing which provides fertile ground for collaboration. Professional DPT students have the opportunity to work with faculty and PhD students on ongoing laboratory projects through optional research practica or as part of the final project, a capstone experience for the curriculum.

Physical Therapy and Rehabilitation Sciences Faculty

Maria Benedetto, DPT *(University of Puerto Rico; Columbia University)*. Associate Clinical Professor. Motor learning and motor control in pediatrics; timed ambulation; obstacle course for children with and without motor disabilities.

Lisa Ann Chiarello, PT, PhD, PCS *(Hahnemann University; Ithaca College) Director, PhD Program*. Professor. Models of service delivery in early intervention; parent-child relationship and the use of play; family-centered care.

David Ebaugh, PT, PhD *(Drexel University)*. Assistant Professor. Quantitative analysis of movement in patients with shoulder pathology; differential diagnosis of shoulder problems; orthopedic examinations and interventions.

Jane Fedorczyk, PT, PhD, CHT, ATC *(Beaver College) Director, Post-Professional Clinical Programs*. Associate Clinical Professor. Hand and upper extremity injuries related to repetitive movement including tendinopathies and nerve compression syndromes.

Kevin E. Gard, DPT, OCS *(Temple University) Vice-Chair, Department of Physical Therapy and Rehabilitation Sciences and Director, Professional Doctor of Physical Therapy Program*. Associate Clinical Professor. Orthopedics; sports medicine.

Noel Goodstadt, DPT, OCS, CSCS *(Pennsylvania State University; Hahnemann University; Temple University)*. Assistant Clinical Professor. Orthopedics, musculoskeletal disorders.

Jan Meiers, PT, DPT, GCS *(Temple University) Assistant Director of Clinical Education*. Assistant Clinical Professor. Wellness in the geriatric population.

Kathryn D. Mitchell, PT, DPT, NCS *(Temple University) Assistant Director of Clinical Education*. Assistant Clinical Professor. Adult neuromuscular rehabilitation, vestibular rehabilitation, and balance and falls; clinical health informatics.

Margaret O'Neil, PT, PhD, MPH *(MCP Hahnemann University; Duke University; University of North Carolina at Chapel Hill)*. Associate Professor. Measurement of and interventions to improve physical activity and fitness levels and promote participation in children and youth with who are overweight/obese and those with physical disabilities (especially cerebral palsy).

Margo Orlin, PT, PhD *(Drexel University) Interim Chair, Department of Physical Therapy and Rehabilitation Sciences*. Associate Professor. Gait and function in children with developmental disabilities, evaluation of musculoskeletal interventions for children with cerebral palsy; enhancing participation for children and adolescents with cerebral palsy.

Robert J. Palisano, PT, ScD, FAPTA *(Boston University)*. Professor. Motor function of children with cerebral palsy, mobility and self-care in children and adolescents with cerebral palsy, evaluation of therapy services in early intervention, outcomes measurement.

Deborah Rose, PT, DPT, PCS *(Drexel University)*. Adjunct Instructor. Pediatric clinical specialist.

Patricia Rubertone, MSW, MPT *(Temple University; Hahnemann University) Director of Clinical Education*. Assistant Clinical Professor. Student learning; course design.

Patricia A. Shewokis, PhD *(University of Georgia)*. Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalograpy (EEG) and methodology and research design.

Sheri Silfies, PT, PhD *(MCP Hahnemann University) Research Lab Coordinator*. Associate Professor. Identification and treatment of impairments in neuromuscular control of trunk mobility and postural stability in patients with low back pain; focusing on mechanism of recurrent low back pain.

Susan Smith, PT, PhD *(University of Connecticut, Texas Woman's University) Associate Dean for Research and Health Professions, Graduate Education, CNHP*. Associate Professor. Health promotion and interventions for manifestations of low bone mass in women; quantitative evaluation and interventions in orthopedic physical therapy with an emphasis on spinal pain and dysfunction.

Sarah Wenger, PT, DPT, OCS *(Arcadia University; Temple University) Coordinator of Experiential Learning*. Assistant Clinical Professor. Health, wellness and fitness, models for preventative physical therapy.

Interdepartmental Faculty

Joseph A. Rubertone, MPT, PhD *(West Virginia University)*. Associate Clinical Professor. Connectivity of vestibular nuclear complex, brain tumor imaging, and clinical studies pertaining to the effectiveness of stroke rehabilitation.

Family/Individual Across the Lifespan Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 38.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 51.1605
Standard Occupational Classification (SOC) Code: 29-1171

This certificate is offered to those individuals who have earned a master's degree in nursing and seek further preparation to become a Family/Individual Across the Lifespan Nurse Practitioner (FNP). Transcripts will be reviewed and course work will be determined on an individual basis. Students meet on campus for a mandatory on-campus Residency at the beginning of the clinical practicum rotations and at the end of the clinical practicum rotations. Graduates will be eligible to sit for the AANP's Family/Individual Across the Lifespan Nurse Practitioner Certification Examination and/or the ANCC's Family/Individual Across the Lifespan Nurse Practitioner Certification Examination.

Program of Study

All incoming post-master's students in nurse practitioner tracks have the opportunity for previous course work to be evaluated on an individual basis for transfer or credit. Pharmacology for family nurse practitioners is required prior to beginning the clinical courses. Students should check with the program coordinator for the exact schedule.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.
- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.
- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.
- Applicants seeking admission into the Family/Individual Across the Lifespan Post-Master's Certificate Program must complete 640 clinical practicum hours. Accepted students will need to be issued a Pennsylvania RN license in addition to their current RN license if it is not from Pennsylvania
- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.
- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibility for previously faculty supervised clinical hours. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.
- A personal interview may be required (online or telephone options will be available).

Required Courses

Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
Concentration Courses		
NURS 534	FNP I: Primary Care of the Emerging Family	5.0
NURS 535	FNP II: Primary and Episodic Care of Infants, Children and Adolescents	5.0
NURS 536	FNP III: Primary Care of Adults and Older Adults Across the Adult Age Spectrum I	5.0
NURS 537	FNP IV: Primary Care of Adults and Older Adults Across the Adult Age Spectrum II	5.0
NURS 538	FNP V: Integrative Practicum in Family Practice Across the Lifespan	4.0
NURS 556	Pharmacology for Family Nurse Practitioners	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Total Credits		**38.0**

Sample Plan of Study

First Year		
Term 1		**Credits**
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
	Term Credits	**7.0**
Term 2		
NURS 556	Pharmacology for Family Nurse Practitioners	3.0
	Term Credits	**3.0**
Term 3		

NURS 550	Advanced Clinical Assessment Diagnostic Reasoning Across the Lifespan	4.0
	Term Credits	**4.0**
Term 4		
NURS 534	FNP I: Primary Care of the Emerging Family	5.0
	Term Credits	**5.0**
Term 5		
NURS 535	FNP II: Primary and Episodic Care of Infants, Children and Adolescents	5.0
	Term Credits	**5.0**
Term 6		
NURS 536	FNP III: Primary Care of Adults and Older Adults Across the Adult Age Spectrum I	5.0
	Term Credits	**5.0**
Term 7		
NURS 537	FNP IV: Primary Care of Adults and Older Adults Across the Adult Age Spectrum II	5.0
	Term Credits	**5.0**
Term 8		
NURS 538	FNP V: Integrative Practicum in Family Practice Across the Lifespan	4.0
	Term Credits	**4.0**

Total Credit: 38.0

Issues in Human Trafficking Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 34.0199
Standard Occupational Classification (SOC) Code: 21.1019

Human Trafficking is an issue of academic and professional importance. A number of organizations, academic and otherwise, are taking the initiative to provide students, service providers, and those working in this area, with a variety of trainings, some of which are general and others more specific to the participants' professional backgrounds and needs. Aside from law enforcement and social service disciplines, the medical and healthcare fields are incorporating a variety of courses and trainings into their curriculum, particularly those with an interest in service learning and social justice issues.

This certificate, which consists of three courses, will provide students with the knowledge and foundation regarding the who, what, when, where, why and how of human trafficking, the role they can play in identifying and supporting victims and what they can do to combat this growing and global phenomenon.

Admission Requirements

- Bachelor's degree from a fully accredited program.
- 3.0 GPA or above on all previous coursework or last 60 credits completed.
- Official transcripts from all previous educational institutions required.
- Personal statement describing interest in certificate program.
- Curriculum Vitae or Resume.
- One professional letter of recommendation.

International applicants, as well as immigrants to the United States and US permanent residents whose native language is not English and who have not received a bachelor's degree or higher in the US, Australia, Canada, Ireland, New Zealand, or the United Kingdom, must show proficiency in English speaking as well as listening, writing. and reading. American citizens born on US military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

- If the TOEFLiBT exam is taken, a minimum combined score for the listening, writing, and reading sections of 79 plus a speaking section score of 26 or higher must be obtained.
- If the TOEFL is taken, a minimum score of 550 or higher and a Test of Spoken English score (TSE) of 55 or higher must be obtained.

Program Requirements

Required Courses

IPS 545	Introduction to Human Trafficking	3.0
IPS 546	Psychosocial Dimensions of Human Trafficking	3.0
IPS 547	Human Trafficking: Domestic and Global Trends	3.0
Total Credits		**9.0**

Additional Information

For more information about this program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu (fr53@drexel.edu)
267.359.5691

Additional information is also available on Drexel's College of Nursing and Health Professions Issues in (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Issues-in-Human-Trafficking) Human Trafficking (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Issues-in-Human-Trafficking) web page and on Drexel University Online's Issues in Human Trafficking (http://www.drexel.com/online-degrees/nursing-degrees/cert-cht) web page

MSN "Bridge" Program

Bridge to the Master of Science in Nursing (MSN): 4.0 quarter credits (no degree awarded at this time)

MSN for Nurses with a Non-Nursing BA or BS

About the Program

Drexel University's RN-MSN "bridge" program is available for nurses who have a bachelor's degree in a field other than nursing and now wish to pursue an MSN degree. Applicants to this program must complete the

admission process to the MSN program and seek initial advisement from the MSN program academic advisors. The bridge program is available only to students applying for the MSN Advance Role programs. It is not available for students wishing to pursue an MSN Nurse Practitioner degree. To learn more about alternative pathways to becoming a nurse practitioner, contact Ms. Amy Pelak or Mr. Redian Furxhiu (see contact information below).

The graduate program department chair reviews the applicant's file for program eligibility and prerequisites are established on an individual basis.

The "bridge" consists of one undergraduate course. Individuals with extensive professional experience may request to waive the bridge course.Contact Mr. Redian Furxhiu (rf53@drexel.edu) or Ms. Amy Pelak Rothstein (ajp347@drexel.edu) for more information. The required "bridge course" in the MSN Advance Role Track is NURS 330 [WI (p. 134)] *Research Basis of Nursing* (4.0 quarter credits). This class is available entirely online, is delivered in 10-week, quarter term session and includes a required field experience. This course is offered in any given term, and includes mandatory synchronous class meetings.

After successfully completing all requirements and admission to the MSN program, students progress directly into graduate-level courses. (Note: The BSN is not awarded in this program.)

Bridge to MSN Requirements

NURS 330 [WI (p. 134)]	Research Basis of Nursing	4.0

See the College's Nursing: MSN-Bridge Program (https://www.drexel.edu/cnhp/academics/graduate/MSN-Bridge) web page for more details about the program, and visit the Drexel University Online MSN Bridge Program (http://www.drexel.com/online-degrees/nursing-degrees/rn-msn-bridge) web page for information about the online delivery format.

Additional Information

For more information about MSN Advance Roles Track program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu (fr53@drexel.edu)
267.359.5691

or

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

MSN in Innovation and Intra/Entrepreneurship in Advanced Nursing Practice Concentration

Major: Nursing Education
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 46.0
Classification of Instructional Programs (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1141

About the Program

Note: Effective Fall Term 2015, students are no longer being accepted into this program. This MSN program has been updated and revised and is now offered as MSN in Nursing Innovation (p. 153).

The MSN in Innovation and Intra/Entrepreneurship in Advanced Nursing Practice is designed for the graduate nursing student who seeks to re-invent and innovate nursing practice in a variety of roles: as clinician, educator, administrator, clinical scientist, or in the business of healthcare. This is the first program of its kind in the nation for inquisitive, innovative nurses who have ideas to improve and change healthcare delivery.

The program offers an entrepreneurial focus and curriculum flexibility to support completion of a substantive capstone project that demonstrates innovation and the extension of the creative boundaries in nursing education, nursing administration, nursing practice or entrepreneurial business.

This program:

- Gives students the ability to make ideas a reality
- Teaches students new skills to support changing ideas into reality
- Develops students as a creative and inventive nurses who can make meaningful and unique contributions to the healthcare industry
- Is right for students if their career objectives may not be met by a traditional graduate nursing curriculum or career path

Students may elect to use the 3 electives to obtain a post-baccalaureate certificate in a specialty area of interest

- Forensic Trends and Issues in Contemporary Healthcare
- Leadership in Health Systems Management
- Nursing Education and Faculty Role
- Issues in Human Trafficking
- Substance Use Disorders Counseling
- Veterans' Healthcare

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

For information about the online delivery format of the new revised MSN in Nursing Innovation program, visit the Drexel University Online MSN in Nursing Innovation (http://www.drexel.com/online-degrees/nursing-degrees/msn-innov) web page.

Admission Requirements

- BSN from a program fully accredited by NLN and or CCNE.
- 3.0 or above on all previous coursework or the last 60 credits completed. Applications from RN's with GPA < 3.0 may be considered on an individual basis.
- Official transcripts from all previous educational institutions are required.
- Two professional references required from colleagues or supervisors who can attest to the applicant's knowledge, skill, and potential aptitude for graduate study.

- Personal Statement describing why the student is interested in this MSN Degree, specifically indicating their idea for an innovative intra/entrepreneurial project/business.
- Curriculum Vitae or Resume
- Copy of Current US RN license required. Copies of any Advanced Practice Nursing Licensure and Certification Documents.
- While specific experience is not required for applicants to the track, previous related work experience may make an applicant more competitive.

International Students: International applicants must possess a BSN (or it's equivalent) and current US RN license. International Applicants, as well as Immigrants to the US and US Permanent Residents, whose native language is not English, and who have not received a Bachelor's degree or higher in the US, Australia, Canada, Ireland, New Zealand or the United Kingdom, and show proficiency in English speaking as well as listening, writing and reading. US citizens born on US military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

If you take the TOEFLiBT exam you are required to have a minimum combined score for the listening, writing and reading sections of 79 Plus a speaking section score of 26 or higher.

If you take the TOEFL, you are required to have a minimum score of 550 or higher and a Test of Spoken English score (TSE) of 55 or higher.

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

Degree Requirements

MSN Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
NURS 544	Quality and Safety in Healthcare	3.0
Required Track Courses		
NURS 586	Innovation in Advanced Nursing Practice: Theory and Application	3.0
NURS 587	Case Studies in Intra/Entrepreneurship and Innovation in Nursing	3.0
Practicum/Capstone Projects		
NURS 652	Innovation Capstone Project	6.0
Support Courses		
NURS 564	The Business of Healthcare	3.0
PROJ 501	Introduction to Project Management	3.0
Electives (by advisement with track coordinator)		12.0-15.0
Total Credits		**45.0-48.0**

Interdepartmental Faculty

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University).* Assistant Clinical Professor. Pediatric and adolescent nursing.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America).* Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

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MSN in Nurse Anesthesia

Major: Nurse Anesthesia
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 51.3804
Standard Occupational Classification (SOC) code: 29.1151

About the Program

The Master of Science in Nursing in nurse anesthesia is a 28-month, 90.0 quarter credit, full-time program. The program offers 18 theoretical nursing and research credits, a 15.0 quarter credit basic science component, a 31.0 quarter credits didactic anesthesia component and a 25.0 credit clinical component. Upon successful completion of the program's outcomes the student is awarded an MSN in nurse anesthesia and is eligible to take the national certification examination offered by the NBCRNA Council on Certification of Nurse Anesthetists.

The Nurse Anesthesia Program is accredited by the:
Council on Accreditation of Nurse Anesthesia Educational Programs
222 South Prospect Avenue, Suite 304
Park Ridge, IL 60068
847.692.7050

PMC in Nurse Anesthesia

The College of Nursing and Health Professions also offers a post-master's certificate in nurse anesthesia (p. 196) option. Upon successful completion of the program's outcomes the student is awarded a certificate in nurse anesthesia and is eligible to take the national certification examination offered by the NBCRNA Council on Certification of Nurse Anesthetists.

Additional Information

For more information, contact the Academic Advisor of the Nurse Anesthesia Program:
MSN Programs Academic Advisor
1601 Cherry St.
267.359.5786

Additional information is also available on Drexel's College of Nursing and Health Professions Nurse Anesthesia Program (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nursing-Nurse-Anesthesia) web page.

Admission Requirements

The nurse anesthesia program begins annually in January. Applications are reviewed continually. Applications should be made 12-18 months in advance of the anticipated January start date. Interviews are conducted throughout the year.
Prospective applicants must demonstrate their ability to pursue graduate work, as exemplified by high scholastic achievement, high aptitude-test scores, and letters of recommendation. Applicants for the nurse anesthesia programs may submit scores from the Miller Analogies Test (MAT) in lieu of the GRE.

For detailed admission requirements, visit the College's MSN in Nurse Anesthesia Admission Requirements (http://www.drexel.edu/gradnursing/msn/nurseAnesthesia/admissions) web page.

An application form and additional requirements and deadline information is available on the the Nurse Anesthesia (http://www.drexel.edu/grad/programs/cnhp/nurse-anesthesia) page of Drexel Admissions website.

Degree Requirements

MSN Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Nurse Anesthesia Core		
NURS 503	Basic Principles of Nurse Anesthesia	3.0
NURS 504	Overview of Nurse Anesthesia	3.0
NURS 505	Chemistry and Physics	3.0
NURS 507	Nurse Anesthesia Pharmacology I	3.0
NURS 510	Advanced Principles of Nurse Anesthesia I	3.0
NURS 511	Nurse Anesthesia Pharmacology II	3.0
NURS 515	Advanced Principles of Nurse Anesthesia II	3.0
NURS 518	Advanced Principles of Nurse Anesthesia III	3.0
NURS 530	Anesthesia Seminar	1.0
NURS 659	Advanced Principles of Nurse Anesthesia IV	3.0
NURS 688	Clinical Correlative Seminars	3.0
NURS 508	Nurse Anesthesia Clinical Practicum I	1.0
NURS 512	Nurse Anesthesia Clinical Practicum II	1.0
NURS 516	Nurse Anesthesia Clinical Practicum III	2.0
NURS 517	Nurse Anesthesia Clinical Practicum IV	3.0
NURS 683	Nurse Anesthesia Clinical Practicum V	3.0
NURS 684	Nurse Anesthesia Clinical Practicum VI	3.0
NURS 687	Clinical Residency I	6.0
NURS 689	Clinical Residency II	6.0
Physiological Science Courses		
NURS 520	Advanced Physiology	3.0
NURS 521	Advanced Pathophysiology I	3.0
NURS 522	Advanced Pathophysiology II	3.0
NURS 523	Advanced Pathophysiology III	3.0
Total Credits		**90.0**

Interdepartmental Faculty

Lew Bennett, CRNA, MSN *(Temple University) Chair, Nurse Anesthesia Department.* Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

Ferne Cohen, CRNA, EdD *(Drexel University) Associate Chair, Nurse Anesthesia Department.* Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

MSN: Nursing Leadership in Health Systems Management Concentration

Major: Nursing Leadership in Health Systems Management
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1141

About the Program

The MSN in Nursing Leadership in Health Systems Management program, designed for part-time attendance by working nurses, prepares students to become nursing leaders in today's rapidly changing health care environment. This online master's degree program will prepare students for a senior role in a fast-changing, increasingly demanding healthcare environment.

The MSN program focuses on the development of a leadership style and the skill set essential for individuals in or seeking administrative roles, including:

- fiscal and organizational management,
- strategic planning,
- integrated quality outcomes measurement,
- organizational structures,
- marketing, and
- management of human resources within organizations.

The program also provides the student with information and strategies to problem solve, make decisions, resolve conflict, address legal/ethical issues and operationalize the mission and goals of the health care delivery organization.

Coursework for the MSN program can be completed online. The MSN also requires two terms of practicum.

The program is fully accredited by the Commission on Collegiate Nursing Education (CCNE).

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Nursing Leadership in Health Systems Management (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nursing-Leadership-in-Health-Systems-Management) web page and Drexel University Online's Nursing Leadership in Health Systems Management (http://www.drexel.com/online-degrees/nursing-degrees/msn-lead) web page.

Admission Requirements

- BSN from a program fully accredited by NLN and or CCNE.
- 3.0 or above on all previous coursework or the last 60 credits completed. Applications from RN's with GPA < 3.0 may be considered on an individual basis.
- Official transcripts from all previous educational institutions are required.
- Two professional references required from colleagues or supervisors who can attest to the applicant's knowledge, skill, and potential aptitude for graduate study.
- Personal Statement describing why the student is interested in this MSN Degree, specifically indicating their idea for an innovative intra/ entrepreneurial project/business.
- Curriculum Vitae or Resume
- Copy of Current US RN license required. Copies of any Advanced Practice Nursing Licensure and Certification Documents.
- While specific experience is not required for applicants to the track, previous related work experience may make an applicant more competitive.

International Students: International applicants must possess a BSN (or it's equivalent) and current US RN license. International Applicants, as well as Immigrants to the US and US Permanent Residents, whose native language is not English, and who have not received a Bachelor's degree or higher in the US, Australia, Canada, Ireland, New Zealand or the United Kingdom, and show proficiency in English speaking as well as listening, writing and reading. US citizens born on US military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

If you take the TOEFLiBT exam you are required to have a minimum combined score for the listening, writing and reading sections of 79 Plus a speaking section score of 26 or higher.

If you take the TOEFL, you are required to have a minimum score of 550 or higher and a Test of Spoken English score (TSE) of 55 or higher.

Degree Requirements

The content addresses the four key areas of organizations: leading the human side of the enterprise, managing resources, managing operations, and managing information. Two threads are incorporated throughout all courses: the importance of professional image in written and live presentations and the use of technology to support and enhance management and care delivery outcomes.

MSN Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0

Support Course

Major Courses

INFO 526	Information, Innovation & Technology in Advanced Nursing Practice	3.0
or NURS 553	Data Analysis for Decision-Making in HC Management	

NURS 557	Leadership and Stewardship in the Health Professions	3.0
NURS 558	Economics of Healthcare Management & Policy	3.0
NURS 547	Communication and Self-Awareness for Leading and Managing in Healthcare	3.0
NURS 564	The Business of Healthcare	3.0
NURS 562	Workforce Management in Healthcare Organizations	3.0
NURS 559	Operations Management in Contemporary Healthcare Organizations	3.0
NURS 567	Strategic Management: Power, Politics and Influence in Healthcare Systems	3.0
Elective		3.0
Practicum Courses		
NURS 568	Practicum and Symposium in Healthcare Operations Management	3.0
NURS 569	Practicum and Symposium in Technology and Management of Information in Healthcare Organizations	3.0
Total Credits		**48.0**

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Nursing Leadership in Health Systems Management (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nursing-Leadership-in-Health-Systems-Management) web page and Drexel University Online's Nursing Leadership in Health Systems Management (http://www.drexel.com/online-degrees/nursing-degrees/msn-lead) web page.

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MSN: Adult-Gerontology Primary Care Nurse Practitioner

Major: Nurse Practitioner, Adult-Gerontology Primary Care
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 52.0
Classification of Instructional Program (CIP) code: 51.3822
Standard Occupational Classification (SOC) code: 29-1171

About the Program

One of the major healthcare challenges of the 21st century will include the delivery of quality, comprehensive, cost effective care for a rapidly increasing number of older adults. With the elderly population in the U.S. expected to double, if not triple, by 2030 it is imperative that there is an educated workforce of health professionals able to deliver high-quality and appropriate care to the adult and older-adult population. In response to this need, Drexel University has developed an Adult-Gerontology Primary Care Nurse Practitioner (AGPC) program. The AGPC cares for individuals (aged 13 years and above) across the lifespan to promote maximal health, reduce risks and manage acute, chronic and complex

health conditions. The AGPC is specifically trained to focus on health and wellness, disease prevention, and quality of life in the aging population. The purpose of our AGPC program is to educate and prepare competent and compassionate AGPC graduates to provide comprehensive, quality and cost effective care founded in evidence-based practice to adults across the lifespan on the continuum of health and illnesss.

All graduates will be eligible to sit for the ANCC Adult Gerontology Primary Care Nurse Practitioner Board Certification examination.

Admission Requirements

- A baccalaureate degree with a major in nursing from a National League of Nursing–accredited program.
- A GPA of 3.0 or above on all previous coursework or 3.25 or above on the last 60 credits of the BSN is required.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing your application will be delayed until you have submitted the remaining transcripts.
- A copy of your current, unrestricted United States RN license/s or eligibility for licensure as a registered nurse. License verification from your nursing license registry website is acceptable.
- Resume or CV (Note: Resume/CV should be detailed regarding work experience, including specific job experiences, responsibilities, and departments).
- Two professional letters of recommendation.
- Personal statement (under 1,000 words) that will give the admissions committee a better understanding of:
  - Why you are choosing this particular program of study,
  - Your plans upon completion of the graduate degree, and
  - How your current work experience will enhance your experience in this MSN program.
- A personal interview by phone or in person may be required.
- International Students: View additional requirements (http://www.drexel.com/online-degrees/nursing-degrees/womenshealthnp/international.aspx) for international students.

Degree Requirements

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0

Support Courses

NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 641	Advanced Pharmacology for Adult-Gerontology Primary Care Nurse Practitioners	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0

Clinical Courses

NURS 660	Adult-Gero Primary Care I: Introduction to Adult-Gero Primary Care and Care of the Young-Adult	5.0
NURS 661	Adult-Gerontology Primary Care II: Management and Care of Adult Patients in Primary Care	5.0
NURS 662	Adult-Gerontology Primary Care III: Management of the Older-Adult Patient in Primary Care	5.0
NURS 663	Adult-Gerontology Primary Care IV: Gerontology Management and Care	5.0
Elective		3.0
Total Credits		**52.0**

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Accreditation. Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Janet Zimmerman, MSN, BSN *(University of Colorado)*. Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University)*. Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

MSN: Adult-Gerontology Acute Care Nurse Practitioner

Major: Nurse Practitioner, Adult-Gerontology Acute Care
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 57.0 quarter credits; 800 clinical hours
Classification of Instructional Programs (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1171

About the Program

The online Adult-Gerontology Acute Care Nurse Practitioner (AG-ACNP) program is designed to prepare practitioners for professional practice in the management of medical, surgical, and critical-care adult patient populations. Concurrent theory and clinical courses provide a knowledge base for the management of adult complex acute, critical, and chronic health care conditions. Clinical practicum rotations allow students to put the principles they have learned into practice in medical, surgical, and critical care settings. Upon completing the program, graduates pursue practice roles across the continuum of acute care services ranging from high-acuity hospital based emergency or intensive care settings to specialty based practices. Graduates are eligible to sit for the ANCC's Adult Gerontology Acute Care Nurse Practitioner Certification Examination.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. Students meet on campus for mandatory On Campus Intensive (OCI) learning experiences, simulation, and evaluation. *Mandatory on-campus visits are essential to students transitioning into the NP role.* These **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives (OCI).

- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation (HPS) experience, depending on the program.

- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives (OCI).

For more information about this program, visit Drexel's MSN Nurse Practitioner Programs (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nurse-Practitioner-Adult-Gerontology-Acute-Care) web page.

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0

NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 554	Pharmacology for Adult-Gerontology Acute Care Nurse Practitioners	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Clinical Courses		
NURS 570	Adult Gerontology Acute Care NP I: Introduction to Adult Gerontology Acute Care Medicine	5.0
NURS 571	Adult Gerontology Acute Care Nurse Practitioner II: Mgnt/Care of Patients in Acute/Crit Care Med Set	5.0
NURS 572	Adult Gerontology Acute Care Nurse Practitioner III: Mgnt/Care of Patients in Acute Surgical Setting	5.0
NURS 573	Adult Gerontology Acute Care NP IV: Management of Care of Patients in Critical Care Settings	5.0
NURS 580	Adult Gero Acute Care NP V: Mgmt/Care of Clients in Acute, Critical Care, Med or Surg Settings	5.0
Elective		3.0
Total Credits		**57.0**

Interdepartmental Faculty

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University)*. Assistant Clinical Professor. Pediatric and adolescent nursing.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America)*. Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Paul Thomas Clements, RN *(University of Pennsylvania)*. Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

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Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Diane DePew, DSN, RN *(University of Alabama, Birmingham)*. Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing education and rehabilitation nursing.

H. Michael Dreher, PhD, RN, FAAN *(Widener University)*. Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education*. Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

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Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health))*. Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span; primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania)*. Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

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MSN: Clinical Nurse Leader Concentration

Major: Clinical Nurse Leader
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1141

About the Program

The MSN Clinical Nurse Leader program is designed to prepare nurses for an evolving advanced generalist role which incorporates advanced knowledge and skill, clinical expertise in an evidence-and-quality-driven context, accountability for outcomes of care, integration of health care services, and clinical leadership for the care of clients, who may be individuals or clinical populations such as those found on a clinical unit or in other settings. The program emphasizes the development of competencies related to the use of technology, evidence-based practice, customization of care, health team and interdisciplinary leadership, and outcome and risk assessment.

This online masters program prepares nurses for advanced clinical roles in a quickly-changing, increasingly complex clinical care environment. Students have the opportunity to develop advanced competencies and depth of knowledge as clinical nurse leaders in adult health. The program emphasizes evidence-based approaches to the solution of clinical problems, assessment of nursing and health care outcomes, clinical decision-making and the design of nursing care for clinical populations at the clinical unit or similar small system level, lateral care integration, and clinically-based leadership.

Clinical practicum experiences provide opportunities for students to deepen clinical skills and develop additional competencies for the management of clients' health care needs at the point-of-care. Precepted clinical experiences will include activities such as modeling of care, assessment and evaluation of aggregate patient outcomes, case management and service integration, unit and interdisciplinary team leadership, teaching and mentoring of staff.

In this as well as other MSN tracks, students build upon the MSN core courses and then move into support courses and specialized coursework. The curriculum also permits students to enroll part-time by spreading the required clinical hours over three terms.

The program is accredited by the Commission on Collegiate Nursing Education.

Additional Information

For more information about this program, contact:

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rf53@drexel.edu (fr53@drexel.edu)
267.359.5691

Additional information is also available on Drexel's College of Nursing and Health Professions MSN in Clinical Nurse Leader (https://www.drexel.edu/cnhp/academics/graduate/MSN-Clinical-Nurse-Leader) web page and on Drexel University Online MSN Clinical Nurse Leader (http://www.drexel.com/online-degrees/nursing-degrees/msn-clinical) web page.

Degree Requirements

MSN Core Courses

INFO 526	Information, Innovation & Technology in Advanced Nursing Practice	3.0
or NURS 544	Quality and Safety in Healthcare	
NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 564	The Business of Healthcare	3.0
Track Courses		
NURS 531	Epidemiology in Action: Tracking Health & Disease	3.0
NURS 532	Evaluation of Health Outcomes	3.0
NURS 602	Foundations for Clinical Nurse Leader	4.0
NURS 603	Clinical Nurse Leader Capstone Immersion I	5.0
NURS 604	Clinical Nurse Leader Capstone Immersion II	5.0
Total Credits		**48.0**

Additional Information

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Admission Requirements

- BSN from a program fully accredited by NLN and or CCNE.
- 3.0 or above on all previous coursework or the last 60 credits completed. Applications from RN's with GPA < 3.0 may be considered on an individual basis.
- Official transcripts from all previous educational institutions are required.
- Two professional references required from colleagues or supervisors who can attest to the applicant's knowledge, skill, and potential aptitude for graduate study.
- Personal Statement describing why the student is interested in this MSN Degree, specifically indicating their idea for an innovative intra/entrepreneurial project/business.
- Curriculum Vitae or Resume
- Copy of Current US RN license required. Copies of any Advanced Practice Nursing Licensure and Certification Documents.
- While specific experience is not required for applicants to the track, previous related work experience may make an applicant more competitive.

International Students: International applicants must possess a BSN (or it's equivalent) and current US RN license. International Applicants, as well as Immigrants to the US and US Permanent Residents, whose native language is not English, and who have not received a Bachelor's degree or higher in the US, Australia, Canada, Ireland, New Zealand or the United Kingdom, and show proficiency in English speaking as well as listening, writing and reading. US citizens born on US military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

If you take the TOEFLiBT exam you are required to have a minimum combined score for the listening, writing and reading sections of 79 Plus a speaking section score of 26 or higher.

If you take the TOEFL, you are required to have a minimum score of 550 or higher and a Test of Spoken English score (TSE) of 55 or higher.

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Clinical Nurse Leader Post-Graduate Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 30.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 51.3801
*Standard Occupational Classification (SOC) Code: 2*9-1141

About the Program

The Clinical Nurse Leader (CNL) oversees care coordination of a distinct group of patients, is a resources for clinical decision making, and serves as a lateral integrator of care. This clinical leader puts evidence-based practice into action to ensure that patients benefit from the latest innovations in care delivery. The CNL collects and evaluates patient outcomes, assesses cohort risk, and has the decision-making authority to change care plans when necessary. This clinician functions as part of an interdisciplinary team by communicating, planning, and implementing care directly with other health care professionals including physicians, pharmacists, social workers, therapists, clinical nurse specialists, and nurse practitioners. The CNL is a leader in the health care delivery system across all setting in which health care is delivered.

Students in this certificate program have the opportunity to learn about healthcare management, policy and quality improvement at the point of care with individuals seeking health care, while obtaining knowledge of healthcare systems, finance and economics. In addition, students will be given the opportunity to learn about advanced clinical assessment, pathophysiology, and advanced pharmacology, if not taken as part of their original MSN.

Students will also learn about designing and redesigning client care based on evidence-based knowledge and analysis of outcomes, as well as gain knowledge of healthcare reimbursement and issues in planning care across the lifespan, as well as the following:

- Application of tools for risk analysis
- Utilize epidemiological methodology to collect data and knowledge acquisition in planning community health promotion programs
- Manage, develop therapeutic partnerships
- Develop, monitor disease management programs promoting healthy lifestyles

Admission Requirements

- Masters degree (MSN) from a program fully accredited by NLN and/or CCNE
- Official transcripts from all previous educational institutions required
- Personal statement describing interest in certificate program and particular specialty
- Curriculum Vitae or resume
- GPA of 2.75 or above on all previous coursework or last 60.0 credits completed

International applicants, as well as immigrants to the United States and US permanent residents whose native language is not English and who have not received a bachelor's degree or higher in the United States, Australia, Canada, Ireland, New Zealand, or the United Kingdom, must show proficiency in English speaking as well as listening, writing. and reading. American citizens born on U.S. military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

- If you take the TOEFLiBT exam, you must have a minimum combined score for the listening, writing, and reading sections of 79 plus a speaking section score of 26 or higher.

- If you take the TOEFL, you must have a minimum score of 550 or higher and a Test of Spoken English score (TSE) of 55 or higher.

The 3 P's (Advanced Pharm, Advanced Pathophysiology and Advanced Clinical Physical Assessment) may be waived if taken within 5 years.

NURS 531	Epidemiology in Action: Tracking Health & Disease	3.0
NURS 532	Evaluation of Health Outcomes	3.0
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 602	Foundations for Clinical Nurse Leader	4.0
NURS 603	Clinical Nurse Leader Capstone Immersion I	5.0
NURS 604	Clinical Nurse Leader Capstone Immersion II	5.0
Total Credits		**30.0**

Additional Information

For more information about this program, contact:

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Additional information is also available on Drexel's College of Nursing and Health Professions MSN in Clinical Nurse Leader (https://www.drexel.edu/cnhp/academics/graduate/MSN-Clinical-Nurse-Leader) web page and on Drexel University Online's MSN Clinical Nurse Leader (http://www.drexel.com/online-degrees/nursing-degrees/msn-clinical) web page.

MSN: Clinical Trials Research Concentration

Major: Clinical Trials Research
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 51.0719
Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Online Clinical Trials Research Program is designed for nurses who wish to be involved in clinical trials and research in a variety of roles and settings. Graduates of this program will be qualified to assume roles such as research coordinator, clinical scientist, developer and clinical trials manager or coordinator.

The program provides knowledge and skills in several critical areas:

- Applying Federal Drug Administration rules and regulations
- Phases of clinical research investigation
- New drug-approval processes
- Drug protocol development
- Budgeting for clinical trials
- Informed consent
- Patient and family issues
- Business management and marketing for clinical trials.

Many potential employers exist outside the hospital environment — in the community or private practices and with the pharmaceutical and other scientific companies that produce, test, and market new products.The clinical trials field is a hot field for nursing employment — especially seasoned nurses who have expertise in one or more clinical areas.

Additional Information

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Admission Requirements

- BSN from a program fully accredited by NLN and or CCNE.
- 3.0 or above on all previous coursework or the last 60 credits completed. Applications from RN's with GPA < 3.0 may be considered on an individual basis.
- Official transcripts from all previous educational institutions are required.
- Two professional references required from colleagues or supervisors who can attest to the applicant's knowledge, skill, and potential aptitude for graduate study.
- Personal Statement describing why the student is interested in this MSN Degree, specifically indicating their idea for an innovative intra/entrepreneurial project/business.
- Curriculum Vitae or Resume
- Copy of Current US RN license required. Copies of any Advanced Practice Nursing Licensure and Certification Documents.
- While specific experience is not required for applicants to the track, previous related work experience may make an applicant more competitive.

International Students: International applicants must possess a BSN (or it's equivalent) and current US RN license. International Applicants, as well as Immigrants to the US and US Permanent Residents, whose native language is not English, and who have not received a Bachelor's degree or higher in the US, Australia, Canada, Ireland, New Zealand or the United Kingdom, and show proficiency in English speaking as well as listening, writing and reading. US citizens born on US military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

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Degree Requirements

The curriculum is based on the following principles:

- All areas of specialization have in common a core of advanced nursing knowledge.
- Every graduate must have knowledge and skill in research and the ability to evaluate and apply research findings.
- The nursing profession anticipates and responds to changing societal, health care and professional needs.
- The foundation for specialization in professional nursing practice is graduate-level education that builds on undergraduate education.

Core Courses

INFO 526	Information, Innovation & Technology in Advanced Nursing Practice	3.0
or NURS 544	Quality and Safety in Healthcare	
NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Major Courses		
NURS 582	Foundation of Good Clinical Practice in Clinical Trials Mngmt	3.0
NURS 583	Operational Leadership in Clinical Trials Management	3.0
NURS 584	Current Topics in Clinical Trials	3.0
NURS 585	Clinical Trials Research Practicum	5.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 557	Leadership and Stewardship in the Health Professions	3.0
Elective		3.0
Total Credits		**45.0**

Additional Information

For more information about this program, contact:

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Certificate in Nursing Innovation

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3801
Standard Occupational Classification (SOC) Code: 29.1141

This Nursing Innovation Certificate program is for individuals who want to understand the theories of innovation, examine some successful and failed innovations, as well as learn what it takes to be a successful intra/entrepreneur. This program is ideal for the student who seeks to re-invent and innovate in nursing practice in a variety of roles, as clinician, educator, administrator, clinical scientist, or in the business environment of healthcare. This certificate is available for individuals that hold a Bachelor's degree.

This program provides a five-course grouping of classes focusing on re-inventing and promoting innovative nursing practice in a variety of roles, as clinician, educator, administrator, clinical scientist or in the business environment of healthcare. Courses are chosen from the MSN in Nursing Innovation. It is designed to emphasize entrepreneurial and intrapreneurial approaches to advanced nursing practice.

Required Courses

NURS 564	The Business of Healthcare	3.0
NURS 586	Innovation in Advanced Nursing Practice: Theory and Application	3.0
NURS 587	Case Studies in Intra/Entrepreneurship and Innovation in Nursing	3.0
NURS 652	Innovation Capstone Project	6.0
PROJ 501	Introduction to Project Management	3.0
Total Credits		**18.0**

MSN: Family/Individual Across the Lifespan Nurse Practitioner

Major: Nursing, Family/Individual Across the Lifespan
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 56.0 quarter credits; 720 clinical hours
Classification of Instructional (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1171

About the Program

The Family/Individual Across the Lifespan Nurse Practitioner (FNP) online program focuses on the application of advanced-practice nursing knowledge—including physical, psychosocial, and environmental assessment skills—to manage common health and illness problems of clients of all ages and their families. It emphasizes health promotion and disease prevention. Family nurse practitioners primarily practice in ambulatory-care settings, such as primary care clinics, physician offices, HMOs, outpatient clinics, schools, nursing centers, emergency departments, long-term care facilities, industry, the armed services, public

health departments, correctional institutions, and home health agencies. Graduates of the program are eligible to sit for the ANCC's Family Nurse Practitioner Examination and/or the AANP's Family Nurse Practitioner Examination.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. *Mandatory on-campus visits are essential to students transitioning into the NP role.* The NP programs provide two on-campus clinical orientations to prepare students for clinical practice rotation. Following clinical orientation, these **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives.
- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation experience (HPS).
- *3rd Year, Winter Term* – students come to campus during the third clinical course for 2-3 days for a second standardized patient lab experience (SPL) and/or human patient simulation experience (HPS).
- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives.

For more information about this program, visit Drexel's MSN Nurse Practitioner Programs (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nurse-Practitioner-Family-Individual-Across-Lifespan) web page.

Degree Requirements

Master of Science in Nursing (MSN): 56.0 quarter credits; 720 clinical hours

MSN - Family/Individual Across the Lifespan Nurse Practitioner Track

Core Courses		
NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 556	Pharmacology for Family Nurse Practitioners	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Clinical Courses		
NURS 534	FNP I: Primary Care of the Emerging Family	5.0
NURS 535	FNP II: Primary and Episodic Care of Infants, Children and Adolescents	5.0
NURS 536	FNP III: Primary Care of Adults and Older Adults Across the Adult Age Spectrum I	5.0
NURS 537	FNP IV: Primary Care of Adults and Older Adults Across the Adult Age Spectrum II	5.0
NURS 538	FNP V: Integrative Practicum in Family Practice Across the Lifespan	4.0

Elective	3.0
Total Credits	**56.0**

Interdepartmental Faculty

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University).* Assistant Clinical Professor. Pediatric and adolescent nursing.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America).* Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

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MSN: Nursing Education Concentration

Major: Nursing Education
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 46.0
Classification of Instructional Programs (CIP) code: 51.3817
Standard Occupational Classification (SOC) code: 25-1072

About the Program

The MSN in Nursing Education program prepares students to work as nursing educators, nursing faculty, or nursing professors in all types of programs, at all levels, in a variety of settings. This program has a special focus on preparing students with the required competencies to be successful on the new certified nursing educator exam. With such a severe and critical nursing faculty shortage in the United States (and even globally)—this program provides students with cutting-edge content essential for today's contemporary nurse educator.

The program integrates theories specific to adult learning, curriculum design and evaluation of courses and programs, critical thinking, both clinical and classroom techniques, and the preparation for the role of the nursing professor. The program also includes opportunities to explore contemporary and leading-edge educational modalities. Knowledge and skills gained through this program are applicable in a variety of settings.

This unique program even instructs students on how to teach online and use technology to teach nursing in innovative ways. The culminating practicum, which runs over two terms, provides students with opportunities to put what has been learned into practice. Participants complete a role practicum experience in teaching, providing ample opportunity to apply theory to practice. In addition, students are required to attend an immersive on-campus simulation residency when taking Practicum. The residency hours will count as part of the required 160 total practicum hours (24 practicum hours earned). The residency is offered biannually in January or July.

Additional Information

For more information about this program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu
267.359.5691

Additional information is also available on Drexel's College of Nursing and Health Professions MSN in Nursing Education (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nursing-Education-Faculty-Role) web page and on Drexel University Online's MSN in Nursing Education (http://www.drexel.com/online-degrees/nursing-degrees/msn-ed) web page.

Admission Requirements

- BSN from a program fully accredited by NLN and or CCNE.
- 3.0 or above on all previous coursework or the last 60 credits completed. Applications from RN's with GPA < 3.0 may be considered on an individual basis.

- Official transcripts from all previous educational institutions are required.
- Two professional references required from colleagues or supervisors who can attest to the applicant's knowledge, skill, and potential aptitude for graduate study.
- Personal Statement describing why the student is interested in this MSN Degree, specifically indicating their idea for an innovative intra/entrepreneurial project/business.
- Curriculum Vitae or Resume
- Copy of Current US RN license required. Copies of any Advanced Practice Nursing Licensure and Certification Documents.
- While specific experience is not required for applicants to the track, previous related work experience may make an applicant more competitive.

International Students: International applicants must possess a BSN (or it's equivalent) and current US RN license. International Applicants, as well as Immigrants to the US and US Permanent Residents, whose native language is not English, and who have not received a Bachelor's degree or higher in the US, Australia, Canada, Ireland, New Zealand or the United Kingdom, and show proficiency in English speaking as well as listening, writing and reading. US citizens born on US military bases abroad may be waived from the TOEFL requirement after providing documentation of this status. Otherwise, applicants must meet one of the following requirements:

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If you take the TOEFL, you are required to have a minimum score of 550 or higher and a Test of Spoken English score (TSE) of 55 or higher.

Degree Requirements

About the Curriculum
The program integrates theories specific to adult learning, curriculum design and evaluation of courses and programs. It combines theory, research and practice from the disciplines of education, management and leadership. Knowledge and skills gained through this program are applicable in a variety of settings in both the academic and clinical arenas. Please note: NURS 632 runs over two quarters.

Required Courses

Core Courses		
INFO 526	Information, Innovation & Technology in Advanced Nursing Practice	3.0
or NURS 544	Quality and Safety in Healthcare	
NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Required Track Courses		
NURS 591	Foundations of Nursing Education	3.0
NURS 606	Curriculum Design for Higher Level Cognition	3.0
NURS 613	The Role and Responsibility of the Nursing Professor	3.0
NURS 615	Assessment, Measurement and Evaluation	3.0
NURS 616	Teaching Methods in Nursing Education	3.0

Practicum		
NURS 632	Nurse Educator and Faculty Role Practicum	6.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
Total Credits		**46.0**

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MSN: Nursing Innovation Concentration

Major: Nursing Innovation
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1141

About the Program

The online MSN in Nursing Innovation is designed for the graduate nursing student who seeks to re-invent and transform the nursing practice in today's tumultuous health care system. Graduates of this accredited program fill innovative and problem-solving roles as clinicians, educators, administrators and clinical scientists; some students choose to move toward and succeed in the business environment of healthcare.

This pioneering master's degree emphasizes problem-solving and creative approaches to advance nursing practice, improve and change healthcare delivery and focuses on models, methods, environments and processes that will give students the tools to transform ideas into reality. It offers a flexible, but rigorous, curriculum, including a substantial capstone project that demonstrates innovation and pushing the creative boundaries to promote real and substantive change.

This program:

- Gives students the ability to make ideas a reality
- Teaches students new skills to support changing ideas into reality
- Develops students as a creative and inventive nurses who can make meaningful and unique contributions to the healthcare industry
- Is right for students if their career objectives may not be met by a traditional graduate nursing curriculum or career path

Students may elect to use the 4-5 electives to obtain a post-baccalaureate certificate in a specialty area of interest including but not limited to the list

below. Or may, with approval, design an individualized plan of study to meet the program requirements.

- Forensic Trends and Issues in Contemporary Healthcare
- Leadership in Health Systems Management
- Nursing Education and Faculty Role
- Issues in Human Trafficking
- Substance Use Disorders Counseling
- Veterans' Healthcare
- Project Management
- Healthcare Informatics

Additional Information

For more information about this program, contact:

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Admission Requirements

- BSN from a program fully accredited by NLN and or CCNE.
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- Official transcripts from all previous educational institutions are required.
- Two professional references required from colleagues or supervisors who can attest to the applicant's knowledge, skill, and potential aptitude for graduate study.
- Personal Statement describing why the student is interested in this MSN Degree, specifically indicating their idea for an innovative intra/entrepreneurial project/business.
- Curriculum Vitae or Resume
- Copy of Current US RN license required. Copies of any Advanced Practice Nursing Licensure and Certification Documents.
- While specific experience is not required for applicants to the track, previous related work experience may make an applicant more competitive.

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Degree Requirements

Core MSN Courses

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Support Courses		
NURS 564	The Business of Healthcare	3.0
PROJ 501	Introduction to Project Management	3.0
Praticum/Capstone Projects		
NURS 652	Innovation Capstone Project	6.0
Electives (by advisement with track coordinator)		12.0-15.0
Total Credits		45.0-48.0

Healthcare Informatics Concentration

PROJ 502	Project Planning & Scheduling	3.0
INFO 648	Healthcare Informatics	3.0
INFO 731	Organization & Social Issues in Healthcare Informatics	3.0
INFO 732	Healthcare Informatics: Planning & Evaluation	3.0

Veterans' Healthcare Concentration

IPS 549	The Military and Veteran Culture	3.0
IPS 550	The Unique Health Care Needs of our Military and Veterans	3.0
IPS 551	Veteran Advocacy	3.0
IPS 552	Veteran Healthcare Policy	3.0

| or CIT 552 | Integrative Advanced Relaxation Techniques (I-ART) | |
| or NURS 552 | Integrative Advanced Relaxation Techniques | |

Complementary & Integrative Therapies Concentration

CIT 501	Foundations of Phytotherapy	3.0
CIT 502	Foundations of Complementary and Integrative Therapies	3.0
CIT 503	Holistic Living For The Caregiver	3.0
or One CIT 500 or 600 level course	Course One CIT 500 or 600 level course Not Found	

Holistic Hospice & Palliative Care Concentration

CIT 503	Holistic Living For The Caregiver	3.0
CIT 621	Spirituality in Hospice and Palliative Care	3.0
CIT 622	Holistic Therapies in Hospice and Palliative Care	3.0
CIT 623	Cross Cultural Issues	3.0

Leadership in Health Systems Management Concentration

NURS 557	Leadership and Stewardship in the Health Professions	3.0
NURS 558	Economics of Healthcare Management & Policy	3.0
NURS 559	Operations Management in Contemporary Healthcare Organizations	3.0
NURS 562	Workforce Management in Healthcare Organizations	3.0
or NURS 564	The Business of Healthcare	
or NURS 567	Strategic Management: Power, Politics and Influence in Healthcare Systems	

Forensic Trends & Issues in Contemporary Healthcare Concentration

PROJ 502	Project Planning & Scheduling	3.0
NURS 519	Forensic Science Foundations	3.0
NURS 528	Victimology – Contemporary Trend	3.0
NURS 533	Forensic Mental Health	3.0

Integrative Addiction Therapies

CIT 503	Holistic Living For The Caregiver	3.0
CIT 624	Foundations of Integrative Addiction Therapy	3.0
CIT 625	Spirituality, Empowerment, and Transformation	3.0
CIT 631	Introduction to Nutritional Neuroscience	3.0

Additional Information

For more information about this program, contact:

Ms. Amy Pelak Rothstein
Student Services Manager
ajp347@drexel.edu (fr53@drexel.edu)
267.359.5692

Additional information is also available on the Drexel's College of Nursing and Health Professions Nursing Innovation (https://www.drexel.edu/cnhp/academics/graduate/MSN-Innovation-and-Intra-Entrepreneurship-Nursing-Practice) web page and Drexel University Online's Nursing (http://www.drexel.com/online-degrees/nursing-degrees/msn-lead) Innovation (http://www.drexel.com/online-degrees/nursing-degrees/msn-innov) web page.

Nursing Faculty

Lisa B. Aiello-Laws, RN, MSN, AOCNS, APN-C *(University of Pennsylvania)*. Assistant Clinical Professor. Adult oncology and cancer genetics.

Scott D. Alcott, MSN *(Drexel University)*. Assistant Clinical Professor. Nursing informatics, leadership, technology, and on-line learning.

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University)*. Assistant Clinical Professor. Pediatric and adolescent nursing.

Barbara Amendolia, DrNP, NNP, APN-BC *(Drexel University)*. Assistant Clinical Professor. Neonatology, specifically feeding difficulties and respiratory diseases of the newborn.

Katherine Kaby Anselmi, PhD, JD, CRNP *(University of Pennsylvania) Assistant Dean of Accreditation/Regulatory Affairs & Online Innovation* . Associate Clinical Professor. Nursing, law, family nurse practitioner, women's health nurse practitioner.

Lew Bennett, CRNA, MSN *(Temple University) Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

Suzan Blacher, MSN, CARN, CCIT *(Drexel University) RN-BSN Program*. Assistant Clinical Professor.

Joan Rosen Bloch, PhD, CRNP *(University of Pennsylvania)*. Associate Professor. Maternal and infant health outcomes with a particular focus on racial and ethnic perinatal health disparities.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America)*. Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Barbara Celia, MSN, EdD *(University of Pennsylvania; Rutgers University)*. Assistant Clinical Professor. Pain management and access to health care.

Paul Thomas Clements, RN *(University of Pennsylvania)*. Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC *(The University of Pennsylvania)*. Assistant Clinical Professor. Critical care nurse practitioner.

Ferne Cohen, CRNA, EdD *(Drexel University) Associate Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

John T. Cornele, MSN, RN, CNE, EMT-P *(Drexel University) Director CICSP*. Instructor. Airway management, nursing and paramedic educational issues, PDA implementation topics, simulation development, use of standardized patients and the art and science of moulage.

Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Linda Dayer-Berenson, PhD, MSN, CRNP, CNE, FAANP *(Rutgers University - formally UMDNJ-SHRP).* Associate Clinical Professor. Adult health, pharmacology, cultural competence and pain management.

Diane DePew, DSN, RN *(University of Alabama, Birmingham).* Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania).* Associate Clinical Professor. Nursing education and rehabilitation nursing.

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC *(New York University, School of Education, Division of Nursing).* Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Gloria Donnelly, PhD *(Bryn Mawr College) Dean of the College of Nursing & Health Professions.* Professor. Nursing education and a variety of mental health topics including assertiveness, stress and change.

Jane Donovan, MSN, RNC *(Villanova University).* Assistant Clinical Professor. Women's health

H. Michael Dreher, PhD, RN, FAAN *(Widener University).* Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Brian Fasolka, MSN, RN, CEN *(DeSales University).* Assistant Clinical Professor. Emergency nursing, adult health nursing, and nursing education.

Theresa Fay-Hillier, RN, MSN *(University of Pennsylvania).* Assistant Clinical Professor. Child, adolescent and family mental health nursing.

Kathleen Fisher, PhD, CRNP *(Pennsylvania State University).* Associate Clinical Professor. Health care for vulnerable populations, decision making in vulnerable populations (i.e. individuals with intellectual disability.)

Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education.* Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

Sandra A. Friedman, MSN, CNM *(Yale University).* Assistant Clinical Professor. Interdisciplinary team simulation and debriefing, health assessment and health promotion, nurse midwifery with specialty in adolescent health, nurse managed health center administration.

Mary Gallagher-Gordon, PhD, MSN, RN, CNE *(Drexel University) Senior Director of Contracts, Compliance and Academic Community Initiatives.* Assistant Clinical Professor. Informatics, patient safety and nursing education, NCLEX review.

Ellen Giarelli, EdD, CRNP *(University of Pennsylvania; Rutgers University) Director of Post-baccalaureate Certificate Program in the Integrated Nusing Care of Autism Spectrum Disorder.* Associate Professor. Genetic/genomic nursing care, self-management of chronic disorders, autism spectrum disorder.

Karen Goldschmidt, MSN, RNC *(Wilmington University) Department Chair, RN-BSN Completion Department .* Assistant Clinical Professor.

Professional issues, nursing education, staff development, scholarly writing.

Maureen Gonzales, MSN, CRNP *(University of Pennsylvania) Public Health Nurse.* Assistant Clinical Professor. Women's health.

Elizabeth Gonzalez, PhD, PMHCNS-BC *(New York University) Department Chair, Doctoral Nursing Program .* Associate Clinical Professor. Chronic stress, geropsychiatry, depression among the elderly, minority health issues and cross-cultural research among family caregivers of relatives with Alzheimer`s disease.

Mary K. Green, MSN, RN, BC *(Drexel University).* Assistant Clinical Professor. Community public health nursing, maternal child health nursing.

Donna Gribbin, RN, DNP, CNE *(Duquesne University).* Assistant Clinical Professor. Medical-surgical nursing, simulation, nursing education.

Cynthia Hambach, MSN, RN, CCRN *(Widener University).* Assistant Clinical Professor. Critical care nursing.

Elizabeth Hammond-Ritschard, RN, MSN *(Cedar Crest College).* Assistant Clinical Professor. Adult health nursing, nursing education.

Thomas L. Hardie, EdD, RN, PMHCNS-BC *(Columbia University, Teachers College).* Associate Professor. Psychiatric nursing, cancer survivorship, treatment research outcomes in substance abuse

Margaret M. Harkins, DNP, MBE, MSN, GNP-BC *(Chatham University).* Assistant Clinical Professor. Gerontology, hospice/palliative care, clinical bioethics.

Angela C. Hawes, MSN, RN *(University of Pennsylvania).* Assistant Clinical Professor. Child and family health nursing.

Karyn Holt, PhD, RN, CNM *(Georgetown University; Touro University) Director of Online Quality, CNHP, Division of Nursing .* Associate Clinical Professor.

Lisa Johnson, DrNP, CRNP, ACNP *(Drexel University).* Assistant Clinical Professor. Surrogate end-of-life decision making within minority populations in the acute care setting; ethnonurishing.

Dana C. Kemery, RN, MSN *(Drexel Universiy).* Assistant Clinical Professor. Emergency nursing (adult and pediatric), nursing education.

Michelle Kensey, MSN, RN *(University of Pennsylvania) Chair of Undergraduate Women's Health, Perinatal Clinical Nurse Specialist.* Assistant Clinical Professor.

Priscilla Killian, MSN, RNC, MHPNP *(LaSalle University).* Assistant Clinical Professor. Global and public health, health promotion, disease prevention in a community setting and the integration of psychiatric and primary care services to the persistently mentally ill living in the community setting.

Cindy M. Little, PhD, WHNP, CNS *(Virginia Commonwealth University in Richmond, VA).* Assistant Clinical Professor. Women's health, obstetrics and clinical genetics.

Jean S. MacFadyen, PhD, RN *(University of Pennsylvania).* Assistant Clinical Professor. Intra-Entrepreneurship in advance practice nursing, gerontology, leadership, transcultural nursing.

Mary Kay Maley, RN, MSN, APN *(University of Medicine and Dentistry of New Jersey)*. Assistant Clinical Professor. Family health, faith community nursing, health promotion/disease prevention and mindfulness-based stress reduction.

Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health, family practice.

Pamela McGee, MSN, FNP-BC, CNE *(University of Pennsylvania)*. Assistant Clinical Professor. Medical/surgical nursing, gerontology, primary care, family nurse practitioner.

Marylou K. McHugh, RN, EdD *(Teachers College; Columbia University)*. Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Faye (Pearlman) Meloy, PhD, MSN, MBA *(Drexel University) Associate Dean, Prelicensure BSN Programs*. Associate Clinical Professor. Clinical practice; education; health policy and planning; community service; human resources and health care administration.

Sally K. Miller, PhD, CRNP *(Walden University)*. Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

Kymberlee Montgomery, DrNP, CRNP *(Drexel University) Chair, NP Programs*. Assistant Clinical Professor. Medicine, women's health nurse practitioner, education, interprofessional education.

Dana Murphy-Parker, MS, CRNP, PMHNP-BC *(University of Colorado) Track Director, Psychiatric Nurse Practitioner Program*. Assistant Clinical Professor.

Louise G. Murray, MSN, CRNP, FNP-BC *(Drexel University)*. Assistant Clinical Professor. Family nurse practitioner.

Maura A. Nitka, MSN, RN, CPN, APN *(Drexel University)*. Assistant Clinical Professor. Pediatric nursing.

Carol Okupniak, MSN, RN *(Thomas Jefferson University)*. Assistant Clinical Professor. Nursing women's health, nursing leadership, informatics.

Jennifer Olszewski, MSN CRNP *(LaSalle University) Director of the Adult-Gerontology Primary Nurse Practitioner Program*. Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health))*. Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span, primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania)*. Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania)*. Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing intervention/outcome studies and nursing treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Brenda Reap-Thompson, MSN, RN *(Villanova University)*. Assistant Clinical Professor. Adult health/nursing eduction; safety and legal issues in nursing and test development.

Mary Jean Ricci, MSN, RN, BC *(University of Pennsylvania) Adjunct Faculty Coordinator*. Assistant Clinical Professor. Community public health, medical-surgical nursing.

Patricia A. Riccio, PhD, RN *(University of California, Los Angeles)*. Assistant Clinical Professor. Research methods and biostatistics.

Leland Rockstraw, PhD, RN *(Drexel University) Assistant Dean, Clinical Simulation and Practice*. Associate Clinical Professor. Adult orthopedic/surgical, emergency care, critical care, and trauma/surgery intensive care.

Al Rundio, Jr., PhD, DNP, RN, APRN, NEA, BC *(University of Pennsylvania) Interim Associate Dean for Advanced Practice Nursing Programs, Chair of DNP Program*. Clinical Professor. Nursing graduate leadership and management track.

Jo Ann Runewicz, EdD, RN, C, MSN *(Nova SE University)*. Assistant Clinical Professor. Gerontology, adult health and education.

Jane Greene Ryan, PhD *(Widener University)*. Assistant Clinical Professor. Nursing women's health.

Donna Sabella, PhD, MEd, MSN, PMHNP-BC *(University of Pennsylvania) Director of Global Studies*. Assistant Clinical Professor. Cultural competence, human trafficking, mental health, forensic nursing, working with vulnerable populations.

Deanna Lynn Schaffer, MSN, RN, CNE, ACNS-BC *(MCP Hahnemann University) Chair of the BSN Co-Op Program*. Assistant Clinical Professor.

Joanne Schwartz, PhD, CRNP, CNE *(Villanova University) Chair of the Accelerated BSN Department*. Assistant Clinical Professor.

Joanne Serembus, EdD, RN, CCRN (Alum), CNE *(Widener University)*. Associate Clinical Professor. Critical care nursing, adult health nursing, nursing education, curriculum development and patient safety.

Susan Solecki, MSN *(Hahnemann University)*. Assistant Clinical Professor. Nursing women's health, adult health, and occupational health.

Ann Thiel-Barrett, DNP, RN, FNP-BC, CNE *(Chatham University)*. Assistant Clinical Professor. Family health nursing.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC *(Chatham University)*. Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

Donna Trinkaus, MSN, RN *(DeSales University)*. Assistant Clinical Professor. Critical care nursing, adult health nursing, infection control and nursing education

AtNena Tucker, DNP, FNP-BC *(University of South Alabama)*. Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

Jeannine Uribe, PhD, RN *(University of Pennsylvania) Community Clinical Coordinator*. Assistant Clinical Professor. Public health nursing; international, professional collaboration, philanthropic health care projects, urban public health issues and caring for immigrant populations.

Roberta Waite, EdD, MSN *(Widener University; University of Pennsylvania) Assistant Dean of Academic Integration and Evaluation of Community Programs*. Associate Professor. Psychiatric nursing; depression and ADHD in minority adults, and the effects of adverse childhood experiences on adult health in minority adults.

Louise Ward, PhD, CRNP, CNE *(Binghamton University)*. Associate Clinical Professor. Public health nursing.

Lori Wheeler, MSN, RN *(West Chester University)*. Assistant Clinical Professor. Adult health nursing, community health nursing, and nursing education.

Regina Willard, MSN, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, cardiology, acute care nurse practitioner.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE *(Rutgers University) Assistant Dean for Special Projects, Simulation & CNE Accreditation*. Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Virginia Wilson, RN, MSN, NEA-BC, NE-BC *(Widener University)*. Assistant Clinical Professor. Leadership and management.

Regina Wright, MSN, CEN *(University of Pennsylvania)*. Assistant Clinical Professor. Care of the adult patient with complex health problems (medical/surgical concentration); professional role development; approaches to adult learning behaviors.

Mary Ann Zimmer, MSN, CPN *(Villanova University)*. Assistant Clinical Professor. Pediatrics, adult medical-surgical nursing, nursing education.

Janet Zimmerman, MSN, BSN *(University of Colorado)*. Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University)*. Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

Graduate Certificate in Nursing Education

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Graduate
Number of Credits to Completion: 18.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51-3817
Standard Occupational Classification (SOC) Code: 29-1171

The Graduate Certificate in Nursing Education program is offered to those individuals who have already earned a master's degree in nursing and seek further preparation in nursing education. The program can be completed through part-time study. Transcripts will be reviewed and course work will be determined on an individual basis.

The program prepares students to work as nursing educators, nursing faculty, or nursing professors in all types of programs, at all levels, in a variety of settings. This program has a special focus on preparing students with the required competencies to be successful on the new certified nursing educator exam. With such a severe and critical nursing faculty shortage in the United States (and even globally)—this program provides students with cutting-edge content essential for today's contemporary nurse educator.

The program integrates theories specific to adult learning, curriculum design and evaluation of courses and programs, critical thinking, both clinical and classroom techniques, and the preparation for the role of the nursing professor. This unique program even instructs students on how to teach online and use technology to teach nursing in innovative ways. The culminating practicum provides students with opportunities to put what has been learned into practice. Participants complete role practicum experiences in teaching, providing ample opportunity to apply theory to practice. In addition, students are required to attend an immersive on-campus simulation residency when taking Practicum. The residency hours will count as part of the required 160 total practicum hours (24 practicum hours earned). The residency is offered biannually in January or July.

Required Courses

NURS 591	Foundations of Nursing Education	3.0
NURS 606	Curriculum Design for Higher Level Cognition	3.0
NURS 615	Assessment, Measurement and Evaluation	3.0
NURS 632	Nurse Educator and Faculty Role Practicum	6.0
Select one of the following:		3.0
NURS 613	The Role and Responsibility of the Nursing Professor	
or NURS 616	Teaching Methods in Nursing Education	
Total Credits		**18.0**

Additional Information

For more information about this program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu
267.359.5691

Additional information is also available on Drexel's College of Nursing and Health Professions Nursing Education Certificate (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Nursing-Education-Faculty-Role) web page and on Drexel University Online's Nursing Education Certificate (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-cnf) web page

MSN: Pediatric Acute Care Nurse Practitioner

Major: Nurse Practitioner, Pediatric Acute Care
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 57.0; 800 clinical hours
Classification of Instructional Programs (CIP) code: 51.3809
Standard Occupational Classification (SOC) code: 29-1171

About the Program

The online Pediatric Acute Nurse Practitioner (PNP-AC) program is designed to prepare practitioners for professional practice in the management of medical, surgical, and critical-care adult patient populations. Concurrent theory and clinical courses provide a knowledge base for the management of pediatric complex acute, critical, and chronic health care conditions. Clinical practicum rotations allow students to put the principles they have learned into practice in medical, surgical, and critical care settings. Upon completing the program, graduates pursue practice roles across the continuum of acute care services ranging from high-acuity hospital based emergency or intensive care settings to specialty based practices. Graduates are eligible to sit for the PNCB's Pediatric Acute Care Nurse Practitioner Certification Examination.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. Students meet on campus for mandatory On Campus Intensive (OCI) learning experiences, simulation, and evaluation. *Mandatory on-campus visits are essential to students transitioning into the NP role.* These **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives (OCI).
- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation (HPS) experience, depending on the program.
- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives (OCI).

Degree Requirements

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0

Support Courses

NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0

Clinical Courses

NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
NURS 649	Ped Nurse Pract AC I:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 650	Ped Nurse Pract AC II:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 651	PNP Management of the Medically Fragile and Technology Dependent Child in the Community	5.0
Elective		3.0
Total Credits		**57.0**

Sample Plan of Study

First Year

Term 1		Credits
NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
RSCH 503	Research Methods and Biostatistics	3.0
	Term Credits	**6.0**
Term 2		
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
	Term Credits	**6.0**
Term 3		
NURS 544	Quality and Safety in Healthcare	3.0
	Term Credits	**3.0**
Term 4		
Elective		3.0
NURS 548	Advanced Pathophysiology	3.0
	Term Credits	**6.0**

Second Year

Term 5		
NURS 549	Advanced Pharmacology	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
	Term Credits	**4.0**
Term 6		
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
	Term Credits	**3.0**
Term 7		
NURS 550	Advanced Clinical Assessment Diagnostic Reasoning Across the Lifespan	4.0
	Term Credits	**4.0**
Term 8		
NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
	Term Credits	**5.0**

Third Year

Term 9

NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
	Term Credits	**5.0**

Term 10

NURS 649	Ped Nurse Pract AC I:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
	Term Credits	**5.0**

Term 11

NURS 650	Ped Nurse Pract AC II:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
	Term Credits	**5.0**

Term 12

NURS 651	PNP Management of the Medically Fragile and Technology Dependent Child in the Community	5.0
	Term Credits	**5.0**

Total Credit: 57.0

Interdepartmental Faculty

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University).* Assistant Clinical Professor. Pediatric and adolescent nursing.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America).* Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Paul Thomas Clements, RN *(University of Pennsylvania).* Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC *(The University of Pennsylvania).* Assistant Clinical Professor. Critical care nurse practitioner.

Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department.* Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Diane DePew, DSN, RN *(University of Alabama, Birmingham).* Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania).* Associate Clinical Professor. Nursing education and rehabilitation nursing.

H. Michael Dreher, PhD, RN, FAAN *(Widener University).* Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education.* Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

Karyn Holt, PhD, RN, CNM *(Georgetown University; Touro University) Director of Online Quality, CNHP, Division of Nursing* . Associate Clinical Professor.

Jean S. MacFadyen, PhD, RN *(University of Pennsylvania).* Assistant Clinical Professor. Intra-Entrepreneurship in advance practice nursing, gerontology, leadership, transcultural nursing.

Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP *(Drexel University).* Assistant Clinical Professor. Nursing, women's health, family practice.

Marylou K. McHugh, RN, EdD *(Teachers College; Columbia University).* Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC *(University of Pennsylvania).* Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP *(University of Pennsylvania).* Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Sally K. Miller, PhD, CRNP *(Walden University).* Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

Kymberlee Montgomery, DrNP, CRNP *(Drexel University) Chair, NP Programs.* Assistant Clinical Professor. Medicine, women's health nurse practitioner, education, interprofessional education.

Dana Murphy-Parker, MS, CRNP, PMHNP-BC *(University of Colorado) Track Director, Psychiatric Nurse Practitioner Program.* Assistant Clinical Professor.

Louise G. Murray, MSN, CRNP, FNP-BC *(Drexel University).* Assistant Clinical Professor. Family nurse practitioner.

Jennifer Olszewski, MSN CRNP *(LaSalle University) Director of the Adult-Gerontology Primary Nurse Practitioner Program.* Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN *(Drexel University).* Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health)).* Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span, primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania).* Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania).* Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN *(University of Pennsylvania).* Associate Clinical Professor. Nursing intervention/outcome studies and nursing

treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC *(Chatham University)*. Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

AtNena Tucker, DNP, FNP-BC *(University of South Alabama)*. Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

Regina Willard, MSN, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, cardiology, acute care nurse practitioner.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE *(Rutgers University) Assistant Dean for Special Projects, Simulation & CNE Accreditation*. Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Janet Zimmerman, MSN, BSN *(University of Colorado)*. Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University)*. Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

MSN: Pediatric Primary Care Nurse Practitioner

Major: Nurse Practitioner, *Pediatric Primary Care*
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 52.0 quarter credits; 640 clinical hours
Classification of Instructional Programs (CIP) code: 51.3809
Standard Occupational Classification (SOC) code: 29-1171

About the Program

The online Pediatric Primary Care Nurse Practitioner (PNP) program is directed toward preparing nurse practitioners who will take advanced nursing roles as clinicians, educators, researchers, and leaders in the rapidly changing, evidence-driven health care environment. The program emphasizes evidence-based practice, interdisciplinary collaboration, and critical use of evolving technology in the care of children and their families. While most pediatric nurse practitioners practice in primary care settings, the continuum of child healthcare spans the geographic settings of home care, ambulatory care, specialty care, urgent care, and rehabilitative care.

Pediatric primary care nurse practitioners provide advanced nursing care across the continuum of healthcare services to meet the specialized physiologic and psychological needs of patients from infancy through adolescence, and have competencies to manage well-child care as well as complex, acute, and chronic healthcare conditions within a family-centered healthcare model. Graduates are eligible to sit for the ANCC's Pediatric Primary Care Nurse Practitioner Examination and/or the PNCB's Pediatric Primary Care Nurse Practitioner Examination.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. Students meet on campus for mandatory On Campus Intensive (OCI) learning experiences, simulations and evaluation. *Mandatory on-campus visits are essential to students transitioning into the NP role.* These **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come in during the first clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation experience (HPS), depending on the program.

- *3rd Year, Fall Term* – students come in during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation experience (HPS), depending on the program.

- *3rd Year, Spring Term* – students come in during the fourth clinical course for 2-3 days for a second standardized patient lab experience (SPL) and/or human patient simulation experience (HPS), depending on the program.

For more information about this program, visit Drexel's MSN Nurse Practitioner Programs (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nurse-Practitioner-Pediatric-Primary-Care) web page.

Degree Requirements

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Clinical Concentration Courses		
NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
NURS 647	PNP III: Management and Care of Adolescents in the Primary Care Setting	5.0
NURS 648	PNP IV: Primary Care of Children with Special Health Care Needs	5.0
Elective		3.0
Total Credits		**52.0**

Sample Plan of Study

Term 1		Credits
NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
RSCH 503	Research Methods and Biostatistics	3.0
	Term Credits	**6.0**

Term 2

NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
	Term Credits	**6.0**

Term 3

NURS 544	Quality and Safety in Healthcare	3.0
	Term Credits	**3.0**

Term 4

NURS 549	Advanced Pharmacology	3.0
Elective		3.0
	Term Credits	**6.0**

Term 5

NURS 548	Advanced Pathophysiology	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
	Term Credits	**4.0**

Term 6

NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
	Term Credits	**3.0**

Term 7

NURS 550	Advanced Clinical Assessment Diagnostic Reasoning Across the Lifespan	4.0
	Term Credits	**4.0**

Term 8

NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
	Term Credits	**5.0**

Term 9

NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
	Term Credits	**5.0**

Term 10

NURS 647	PNP III: Management and Care of Adolescents in the Primary Care Setting	5.0
	Term Credits	**5.0**

Term 11

NURS 648	PNP IV: Primary Care of Children with Special Health Care Needs	5.0
	Term Credits	**5.0**

Total Credit: 52.0

MSN: Pediatric Primary Care and Pediatric Acute Care Dual Option

Major: Nurse Practitioner, Pediatric Primary Care and Pediatric Acute Care
Degree Awarded: Master of Science
Calendar Type: Quarter
Total Credit Hours: 62.0; 1000 clinical hours
Classification of Instructional Programs (CIP) code: 51.3809
Standard Occupational Classification (SOC) code: 29-1171

About the Program

The Pediatric Primary Care and Pediatric Acute Care Nurse Practitioner Program at Drexel University will prepare the Pediatric Nurse Practitioner to perform acts of medical diagnosis and treatment through didactic lectures, problem-based learning, clinical practice hours, standardized patient experiences and high-fidelity simulation.

This innovative dual option track coincides with the new models of healthcare delivery and the increasing demand for PNPs to provide care for children and their families across the entire continuum of health and illness, including acute critical conditions. The clinical practice settings for the dual certification track options provides students with a mixed inpatient/outpatient experience ranging from specialty clinics and primary care settings. Diverse clinical settings provide supervised clinical hours to allow the student advance practitioner to perform advance physical assessment, critical thinking, diagnostic reasoning and management of care in collaboration with licensed physician and APN's in accredited institutions. Students graduating from this track will be eligible to sit to both the Pediatric Primary Care and the Pediatric Acute Care Board Certifications through the PNCB.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. Students meet on campus for mandatory On Campus Intensive (OCI) learning experiences, simulation, and evaluation. *Mandatory on-campus visits each quarter are essential to students transitioning into the NP role.* These **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives.
- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation experience (HPS).
- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives

Admission Requirements

- A completed application.
- A bachelor's degree with a major in nursing (BSN) from a CCNE or NLN accredited program with a GPA of 3.0 or above on all previous coursework or 3.25 or above on the last 60 credits of the BSN.
- A minimum of one year nursing experience in a pediatric acute care setting
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Transcripts must be supplied regardless of the number of credits earned or the type of school attended. Instead of hard copy transcripts, post-secondary institutions can supply official electronic transcripts directly to Drexel University Online through a password secured link or website (email to: customerservice@drexel.com). If all post-secondary institutions are not listed on applications and these appear on transcripts received from other institutions, applications will not be reviewed until all remaining transcripts have been submitted. The Transcript Lookup Tool can be used to assist in contacting previous institutions.
- Two letters of recommendation. You may use our electronic letter of recommendation service. If a recommender prefers to submit an original, hard copy letter, please remind them that it must include an ink signature and be submitted in a sealed envelope.

- Personal statement (800 - 1600 words) that will give the admissions committee a better understanding of:
  - Why you are choosing this particular program of study
  - Your plans upon completion of the degree
  - How your current work experience will enhance your experience in this program
- Resume
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse and any advanced practice nursing licensure and certification documents. License verification from your nursing license registry website is acceptable.
- A copy of your current PALS certification
- Additional requirements must be met for International Students

All submitted materials become the property of Drexel University.

Degree Requirements

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0

Support Courses

NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Elective		3.0

Clinical Courses

NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
NURS 647	PNP III: Management and Care of Adolescents in the Primary Care Setting	5.0
NURS 649	Ped Nurse Pract AC I:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 650	Ped Nurse Pract AC II:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 651	PNP Management of the Medically Fragile and Technology Dependent Child in the Community	5.0
Total Credits		**62.0**

Nursing Faculty

Lisa B. Aiello-Laws, RN, MSN, AOCNS, APN-C *(University of Pennsylvania)*. Assistant Clinical Professor. Adult oncology and cancer genetics.

Scott D. Alcott, MSN *(Drexel University)*. Assistant Clinical Professor. Nursing informatics, leadership, technology, and on-line learning.

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University)*. Assistant Clinical Professor. Pediatric and adolescent nursing.

Barbara Amendolia, DrNP, NNP, APN-BC *(Drexel University)*. Assistant Clinical Professor. Neonatology, specifically feeding difficulties and respiratory diseases of the newborn.

Katherine Kaby Anselmi, PhD, JD, CRNP *(University of Pennsylvania) Assistant Dean of Accreditation/Regulatory Affairs & Online Innovation* . Associate Clinical Professor. Nursing, law, family nurse practitioner, women's health nurse practitioner.

Lew Bennett, CRNA, MSN *(Temple University) Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

Suzan Blacher, MSN, CARN, CCIT *(Drexel University) RN-BSN Program*. Assistant Clinical Professor.

Joan Rosen Bloch, PhD, CRNP *(University of Pennsylvania)*. Associate Professor. Maternal and infant health outcomes with a particular focus on racial and ethnic perinatal health disparities.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America)*. Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Barbara Celia, MSN, EdD *(University of Pennsylvania; Rutgers University)*. Assistant Clinical Professor. Pain management and access to health care.

Paul Thomas Clements, RN *(University of Pennsylvania)*. Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC *(The University of Pennsylvania)*. Assistant Clinical Professor. Critical care nurse practitioner.

Ferne Cohen, CRNA, EdD *(Drexel University) Associate Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

John T. Cornele, MSN, RN, CNE, EMT-P *(Drexel University) Director CICSP*. Instructor. Airway management, nursing and paramedic educational issues, PDA implementation topics, simulation development, use of standardized patients and the art and science of moulage.

Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Linda Dayer-Berenson, PhD, MSN, CRNP, CNE, FAANP *(Rutgers University - formally UMDNJ-SHRP)*. Associate Clinical Professor. Adult health, pharmacology, cultural competence and pain management.

Diane DePew, DSN, RN *(University of Alabama, Birmingham)*. Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing education and rehabilitation nursing.

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC *(New York University, School of Education, Division of Nursing).* Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Gloria Donnelly, PhD *(Bryn Mawr College) Dean of the College of Nursing & Health Professions.* Professor. Nursing education and a variety of mental health topics including assertiveness, stress and change.

Jane Donovan, MSN, RNC *(Villanova University).* Assistant Clinical Professor. Women's health

H. Michael Dreher, PhD, RN, FAAN *(Widener University).* Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Brian Fasolka, MSN, RN, CEN *(DeSales University).* Assistant Clinical Professor. Emergency nursing, adult health nursing, and nursing education.

Theresa Fay-Hillier, RN, MSN *(University of Pennsylvania).* Assistant Clinical Professor. Child, adolescent and family mental health nursing.

Kathleen Fisher, PhD, CRNP *(Pennsylvania State University).* Associate Clinical Professor. Health care for vulnerable populations, decision making in vulnerable populations (i.e. individuals with intellectual disability.)

Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education.* Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

Sandra A. Friedman, MSN, CNM *(Yale University).* Assistant Clinical Professor. Interdisciplinary team simulation and debriefing, health assessment and health promotion, nurse midwifery with specialty in adolescent health, nurse managed health center administration.

Mary Gallagher-Gordon, PhD, MSN, RN, CNE *(Drexel University) Senior Director of Contracts, Compliance and Academic Community Initiatives.* Assistant Clinical Professor. Informatics, patient safety and nursing education, NCLEX review.

Ellen Giarelli, EdD, CRNP *(University of Pennsylvania; Rutgers University) Director of Post-baccalaureate Certificate Program in the Integrated Nusing Care of Autism Spectrum Disorder.* Associate Professor. Genetic/genomic nursing care, self-management of chronic disorders, autism spectrum disorder.

Karen Goldschmidt, MSN, RNC *(Wilmington University) Department Chair, RN-BSN Completion Department* . Assistant Clinical Professor. Professional issues, nursing education, staff development, scholarly writing.

Maureen Gonzales, MSN, CRNP *(University of Pennsylvania) Public Health Nurse.* Assistant Clinical Professor. Women's health.

Elizabeth Gonzalez, PhD, PMHCNS-BC *(New York University) Department Chair, Doctoral Nursing Program* . Associate Clinical Professor. Chronic stress, geropsychiatry, depression among the elderly, minority health issues and cross-cultural research among family caregivers of relatives with Alzheimer`s disease.

Mary K. Green, MSN, RN, BC *(Drexel University).* Assistant Clinical Professor. Community public health nursing, maternal child health nursing.

Donna Gribbin, RN, DNP, CNE *(Duquesne University).* Assistant Clinical Professor. Medical-surgical nursing, simulation, nursing education.

Cynthia Hambach, MSN, RN, CCRN *(Widener University).* Assistant Clinical Professor. Critical care nursing.

Elizabeth Hammond-Ritschard, RN, MSN *(Cedar Crest College).* Assistant Clinical Professor. Adult health nursing, nursing education.

Thomas L. Hardie, EdD, RN, PMHCNS-BC *(Columbia University, Teachers College).* Associate Professor. Psychiatric nursing, cancer survivorship, treatment research outcomes in substance abuse

Margaret M. Harkins, DNP, MBE, MSN, GNP-BC *(Chatham University).* Assistant Clinical Professor. Gerontology, hospice/palliative care, clinical bioethics.

Angela C. Hawes, MSN, RN *(University of Pennsylvania).* Assistant Clinical Professor. Child and family health nursing.

Karyn Holt, PhD, RN, CNM *(Georgetown University; Touro University) Director of Online Quality, CNHP, Division of Nursing* . Associate Clinical Professor.

Lisa Johnson, DrNP, CRNP, ACNP *(Drexel University).* Assistant Clinical Professor. Surrogate end-of-life decision making within minority populations in the acute care setting; ethnonurishing.

Dana C. Kemery, RN, MSN *(Drexel Universiy).* Assistant Clinical Professor. Emergency nursing (adult and pediatric), nursing education.

Michelle Kensey, MSN, RN *(University of Pennsylvania) Chair of Undergraduate Women's Health, Perinatal Clinical Nurse Specialist.* Assistant Clinical Professor.

Priscilla Killian, MSN, RNC, MHPNP *(LaSalle University).* Assistant Clinical Professor. Global and public health, health promotion, disease prevention in a community setting and the integration of psychiatric and primary care services to the persistently mentally ill living in the community setting.

Cindy M. Little, PhD, WHNP, CNS *(Virginia Commonwealth University in Richmond, VA).* Assistant Clinical Professor. Women's health, obstetrics and clinical genetics.

Jean S. MacFadyen, PhD, RN *(University of Pennsylvania).* Assistant Clinical Professor. Intra-Entrepreneurship in advance practice nursing, gerontology, leadership, transcultural nursing.

Mary Kay Maley, RN, MSN, APN *(University of Medicine and Dentistry of New Jersey).* Assistant Clinical Professor. Family health, faith community nursing, health promotion/disease prevention and mindfulness-based stress reduction.

Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP *(Drexel University).* Assistant Clinical Professor. Nursing, women's health, family practice.

Pamela McGee, MSN, FNP-BC, CNE *(University of Pennsylvania).* Assistant Clinical Professor. Medical/surgical nursing, gerontology, primary care, family nurse practitioner.

Marylou K. McHugh, RN, EdD *(Teachers College; Columbia University)*. Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Faye (Pearlman) Meloy, PhD, MSN, MBA *(Drexel University) Associate Dean, Prelicensure BSN Programs*. Associate Clinical Professor. Clinical practice; education; health policy and planning; community service; human resources and health care administration.

Sally K. Miller, PhD, CRNP *(Walden University)*. Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

Kymberlee Montgomery, DrNP, CRNP *(Drexel University) Chair, NP Programs*. Assistant Clinical Professor. Medicine, women's health nurse practitioner, education, interprofessional education.

Dana Murphy-Parker, MS, CRNP, PMHNP-BC *(University of Colorado) Track Director, Psychiatric Nurse Practitioner Program*. Assistant Clinical Professor.

Louise G. Murray, MSN, CRNP, FNP-BC *(Drexel University)*. Assistant Clinical Professor. Family nurse practitioner.

Maura A. Nitka, MSN, RN, CPN, APN *(Drexel University)*. Assistant Clinical Professor. Pediatric nursing.

Carol Okupniak, MSN, RN *(Thomas Jefferson University)*. Assistant Clinical Professor. Nursing women's health, nursing leadership, informatics.

Jennifer Olszewski, MSN CRNP *(LaSalle University) Director of the Adult-Gerontology Primary Nurse Practitioner Program*. Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health))*. Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span; primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania)*. Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania)*. Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing intervention/outcome studies and nursing treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Brenda Reap-Thompson, MSN, RN *(Villanova University)*. Assistant Clinical Professor. Adult health/nursing eduction; safety and legal issues in nursing and test development.

Mary Jean Ricci, MSN, RN, BC *(University of Pennsylvania) Adjunct Faculty Coordinator*. Assistant Clinical Professor. Community public health, medical-surgical nursing.

Patricia A. Riccio, PhD, RN *(University of California, Los Angeles)*. Assistant Clinical Professor. Research methods and biostatistics.

Leland Rockstraw, PhD, RN *(Drexel University) Assistant Dean, Clinical Simulation and Practice*. Associate Clinical Professor. Adult orthopedic/surgical, emergency care, critical care, and trauma/surgery intensive care.

Al Rundio, Jr., PhD, DNP, RN, APRN, NEA, BC *(University of Pennsylvania) Interim Associate Dean for Advanced Practice Nursing Programs, Chair of DNP Program*. Clinical Professor. Nursing graduate leadership and management track.

Jo Ann Runewicz, EdD, RN, C, MSN *(Nova SE University)*. Assistant Clinical Professor. Gerontology, adult health and education.

Jane Greene Ryan, PhD *(Widener University)*. Assistant Clinical Professor. Nursing women's health.

Donna Sabella, PhD, MEd, MSN, PMHNP-BC *(University of Pennsylvania) Director of Global Studies*. Assistant Clinical Professor. Cultural competence, human trafficking, mental health, forensic nursing, working with vulnerable populations.

Deanna Lynn Schaffer, MSN, RN, CNE, ACNS-BC *(MCP Hahnemann University) Chair of the BSN Co-Op Program*. Assistant Clinical Professor.

Joanne Schwartz, PhD, CRNP, CNE *(Villanova University) Chair of the Accelerated BSN Department*. Assistant Clinical Professor.

Joanne Serembus, EdD, RN, CCRN (Alum), CNE *(Widener University)*. Associate Clinical Professor. Critical care nursing, adult health nursing, nursing education, curriculum development and patient safety.

Susan Solecki, MSN *(Hahnemann University)*. Assistant Clinical Professor. Nursing women's health, adult health, and occupational health.

Ann Thiel-Barrett, DNP, RN, FNP-BC, CNE *(Chatham University)*. Assistant Clinical Professor. Family health nursing.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC *(Chatham University)*. Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

Donna Trinkaus, MSN, RN *(DeSales University)*. Assistant Clinical Professor. Critical care nursing, adult health nursing, infection control and nursing education

AtNena Tucker, DNP, FNP-BC *(University of South Alabama)*. Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

Jeannine Uribe, PhD, RN *(University of Pennsylvania) Community Clinical Coordinator*. Assistant Clinical Professor. Public health nursing; international, professional collaboration, philanthropic health care projects, urban public health issues and caring for immigrant populations.

Roberta Waite, EdD, MSN *(Widener University; University of Pennsylvania) Assistant Dean of Academic Integration and Evaluation*

of Community Programs. Associate Professor. Psychiatric nursing; depression and ADHD in minority adults, and the effects of adverse childhood experiences on adult health in minority adults.

Louise Ward, PhD, CRNP, CNE *(Binghamton University).* Associate Clinical Professor. Public health nursing.

Lori Wheeler, MSN, RN *(West Chester University).* Assistant Clinical Professor. Adult health nursing, community health nursing, and nursing education.

Regina Willard, MSN, RN *(Drexel University).* Assistant Clinical Professor. Nursing, cardiology, acute care nurse practitioner.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE *(Rutgers University) Assistant Dean for Special Projects, Simulation & CNE Accreditation.* Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Virginia Wilson, RN, MSN, NEA-BC, NE-BC *(Widener University).* Assistant Clinical Professor. Leadership and management.

Regina Wright, MSN, CEN *(University of Pennsylvania).* Assistant Clinical Professor. Care of the adult patient with complex health problems (medical/surgical concentration); professional role development; approaches to adult learning behaviors.

Mary Ann Zimmer, MSN, CPN *(Villanova University).* Assistant Clinical Professor. Pediatrics, adult medical-surgical nursing, nursing education.

Janet Zimmerman, MSN, BSN *(University of Colorado).* Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University).* Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

MSN: Psychiatric Mental Health Nurse Practitioner

Major: Nurse Practitioner, Psychiatric Mental Health
Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 52.0 quarter credits; 640 clinical hours
Classification of Instructional Programs (CIP) code: 58.3810
Standard Occupational Classification (SOC) code: 29-1123

About the Program

The online Psychiatric Mental Health Nurse Practitioner (PMHNP) program prepares practitioners to provide a wide range of services to patients across the lifespan and their families. The program of study is based on a biopsychosocial model of care and includes the study and application of diagnostic and treatment modalities, and theories and approaches to practice. Graduates of this program practice in a wide variety of settings as this program enables them to provide direct (assessment, intervention) and indirect (consultation, case management, and supervision) advanced practice services to individuals who are at risk and those who need mental health services. Graduates are eligible to sit for the ANCC's Psychiatric Mental Health Certification Examination.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. Students meet on campus for mandatory On-Campus Intensive (OCI) learning experiences, simulation, and evaluation. *Mandatory on-campus visits each quarter are essential to students transitioning into the NP role.* Following clinical orientation, these **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives.
- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation experience (HPS).
- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives.

For more information about this program, visit Drexel's MSN Nurse Practitioner Programs (http://www.drexel.edu/gradnursing/msn/nursePractitioner) web page.

Degree Requirements

Master of Science in Nursing (MSN): 52.0 quarter credits; 640 clinical hours

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
RSCH 503	Research Methods and Biostatistics	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 555	Psychopharmacology Across the Lifespan	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
Clinical Courses		
NURS 592	PMHNP I: Advanced Mental Health Nurse Practitioner Theoretical Foundations and Psychopathology I	5.0
NURS 593	PMHNP II: Advanced Mental Health Nurse Practitioner Theoretical Foundations and Psychopathology II	5.0
NURS 594	PMHNP III: Adv Mental Hlth NP Treatment Modalities for Diverse Populations Across the Lifespan	5.0
NURS 595	PMHNP IV: Adv Mental Hlth NP Management and Care of Clients in Diverse Pop Across the Lifespan.	5.0
Elective		3.0
Total Credits		**52.0**

Interdepartmental Faculty

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University).* Assistant Clinical Professor. Pediatric and adolescent nursing.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America).* Associate Clinical Professor. Pediatric primary care, health

disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Paul Thomas Clements, RN *(University of Pennsylvania)*. Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC *(The University of Pennsylvania)*. Assistant Clinical Professor. Critical care nurse practitioner.

Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Diane DePew, DSN, RN *(University of Alabama, Birmingham)*. Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing education and rehabilitation nursing.

H. Michael Dreher, PhD, RN, FAAN *(Widener University)*. Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education*. Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

Karyn Holt, PhD, RN, CNM *(Georgetown University; Touro University) Director of Online Quality, CNHP, Division of Nursing* . Associate Clinical Professor.

Jean S. MacFadyen, PhD, RN *(University of Pennsylvania)*. Assistant Clinical Professor. Intra-Entrepreneurship in advance practice nursing, gerontology, leadership, transcultural nursing.

Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health, family practice.

Marylou K. McHugh, RN, EdD *(Teachers College; Columbia University)*. Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Sally K. Miller, PhD, CRNP *(Walden University)*. Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

Kymberlee Montgomery, DrNP, CRNP *(Drexel University) Chair, NP Programs*. Assistant Clinical Professor. Medicine, women's health nurse practitioner, education, interprofessional education.

Dana Murphy-Parker, MS, CRNP, PMHNP-BC *(University of Colorado) Track Director, Psychiatric Nurse Practitioner Program*. Assistant Clinical Professor.

Louise G. Murray, MSN, CRNP, FNP-BC *(Drexel University)*. Assistant Clinical Professor. Family nurse practitioner.

Jennifer Olszewski, MSN CRNP *(LaSalle University) Director of the Adult-Gerontology Primary Nurse Practitioner Program*. Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health))*. Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span, primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania)*. Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania)*. Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing intervention/outcome studies and nursing treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC *(Chatham University)*. Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

AtNena Tucker, DNP, FNP-BC *(University of South Alabama)*. Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

Regina Willard, MSN, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, cardiology, acute care nurse practitioner.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE *(Rutgers University) Assistant Dean for Special Projects, Simulation & CNE Accreditation*. Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Janet Zimmerman, MSN, BSN *(University of Colorado)*. Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University)*. Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

MSN: Women's Health/Gender Related Nurse Practitioner

Major: Nurse Practitioner, Women's Health/Gender Related

Degree Awarded: Master of Science in Nursing (MSN)
Calendar Type: Quarter
Total Credit Hours: 55.0 quarter credits; 640 clinical hours
Classification of Instructional Programs (CIP) code: 51.3822
Standard Occupational Classification (SOC) code: 29-1171

About the Program

The online Women's Health/Gender Related Nurse Practitioner track offers didactic and clinical education is via distance learning and concurrent clinical preceptorships. The courses offered throughout the track reflect the competencies and skill sets required for today's women's health nurse practitioner as knowledge expands, health care systems evolve, technology advances and practice changes in response to current needs and evidence-based research. Additionally, this track offers the opportunity for students to work in transdisciplinary simulated scenarios to promote a better understanding and respect of discipline-specific roles, improve existing communication and collaboration within disciplines, and initiate teamwork development in order to promote patient safety and high-quality patient care. Graduates are eligible to sit for the NCC's Women's Health/Gender Related Nurse Practitioner Examination.

The nurse practitioner faculty is committed to quality and excellence in the nurse practitioner (NP) programs. Students meet on campus for mandatory On Campus Intensive (OCI) learning experiences, simulation, and evaluation. *Mandatory on-campus visits are essential to students transitioning into the NP role.* These **mandatory** on-campus visits occur during the following times:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives (OCI).
- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation (HPS) experience.
- *3rd Year, Winter Term* – students come to campus during the third clinical course for 2-3 days for a second standardized patient lab experience (SPL) and/or human patient simulation experience (HPS).
- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives (OCI).

For more information about this program, visit Drexel's MSN Nurse Practitioner Programs (https://www.drexel.edu/cnhp/academics/graduate/MSN-Nurse-Practitioner-Womens-Health-Gender-Related) web page.

Core Courses

NURS 500	Confronting Issues in Contemporary Health Care Environments	3.0
NURS 502	Advanced Ethical Decision Making in Health Care	3.0
NURS 544	Quality and Safety in Healthcare	3.0
RSCH 503	Research Methods and Biostatistics	3.0
RSCH 504	Evaluation and Translation of Health Research	3.0
Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
NURS 680	Primary Care for Women's Health	3.0
NURS 682	Pharmacology for the Women's Health Nurse Practitioner	3.0

Clinical Concentration Courses

NURS 690	WHNP I: Mngmnt & Care of the Common Gyn and Gender Related Issues throughout the Lifespan	5.0
NURS 691	WHNP II: Mngmnt & Care of the Complex Gyn and Gender Related Issues of Women throughout the Lifespan	5.0
NURS 692	WHNP III: Management & Care of the Low Risk Obstetrical and Post Partum Needs of Women and Families	5.0
NURS 693	WHNP IV: Mngmnt & Care of the High Risk Obstetrical and Post Partum Needs of Women and Families	5.0
Elective		3.0
Total Credits		**55.0**

Interdepartmental Faculty

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University)*. Assistant Clinical Professor. Pediatric and adolescent nursing.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America)*. Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Paul Thomas Clements, RN *(University of Pennsylvania)*. Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC *(The University of Pennsylvania)*. Assistant Clinical Professor. Critical care nurse practitioner.

Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Diane DePew, DSN, RN *(University of Alabama, Birmingham)*. Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing education and rehabilitation nursing.

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Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education*. Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

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Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health, family practice.

Marylou K. McHugh, RN, EdD *(Teachers College; Columbia University)*. Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP *(University of Pennsylvania)*. Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Sally K. Miller, PhD, CRNP *(Walden University)*. Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

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Louise G. Murray, MSN, CRNP, FNP-BC *(Drexel University)*. Assistant Clinical Professor. Family nurse practitioner.

Jennifer Olszewski, MSN CRNP *(LaSalle University) Director of the Adult-Gerontology Primary Nurse Practitioner Program*. Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health))*. Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span; primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania)*. Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania)*. Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing intervention/outcome studies and nursing treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC *(Chatham University)*. Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

AtNena Tucker, DNP, FNP-BC *(University of South Alabama)*. Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

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Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE *(Rutgers University) Assistant Dean for Special Projects, Simulation & CNE Accreditation*. Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Janet Zimmerman, MSN, BSN *(University of Colorado)*. Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University)*. Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

Art Therapy and Counseling

Major: Art Therapy and Counseling
Degree Awarded: Master of Arts (MA)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 51.2301
Standard Occupational Classification (SOC) code: 29-1129

About the Program

The graduate Art Therapy and Counseling Program offers a progressive curriculum that integrates didactic, experiential, supervisory, and clinical experiences to prepare students for providing art therapy services in a range of settings. Students learn theories applied to art therapy practice and contemporary approaches that support their understanding of the healing aspects of the creative process. Emphasis is placed on the complex interactions among the client, the therapist, and the art process that promote therapeutic change. Students apply this knowledge in practicum and internship experiences offered in a variety of behavioral health and community settings, such as psychiatric hospitals, medical facilities, schools, forensic settings, and shelters.

We provide educational experiences to promote professional development and multicultural competence conducive to the ethical, reflective, and socially-aware practice of art therapy. Our aim is to prepare professional art therapists capable of critical thinking with regard to the therapeutic use of art and the creative process while promoting respect for the diversity of human experiences.

For additional information about the program, visit the College of Nursing and Health Professions' Art Therapy and Counseling (https://www.drexel.edu/cnhp/academics/graduate/MA-Art-Therapy-Counseling) website.

Degree Requirements

Core Courses

ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 504	Human Psychological Development I	2.0
ARTS 509	Human Psychological Development II	2.0
ARTS 505	Clinical Diagnosis of Psychopathology I	2.0
ARTS 513	Clinical Diagnosis of Psychopathology II	2.0
ARTS 506	Professional Orientation and Ethics I	1.0

ARTS 606	Professional Orientation and Ethics II	3.0
ARTS 507	Group Dynamics and Therapy	2.0
ARTS 508	Introduction to Behavioral Research I	2.0
ARTS 515	Introduction to Behavioral Research II	2.0
ARTS 601	Theories of Psychotherapy I	2.0
ARTS 604	Career Counseling	4.0
ARTS 605	Theories of Psychotherapy II	2.0
ARTS 602	Multicultural Perspectives in Therapy I	2.0
ARTS 603	Clinical Appraisal and Assessment I	2.0
ARTS 607	Clinical Appraisal and Assessment II	2.0

Art Therapy Track Courses

ARTS 531	Art Therapy Assessment and Treatment for Adults I	2.0
ARTS 532	Art Therapy Assessment and Treatment for Adults II	2.0
ARTS 533	Art Therapy Assessment and Treatment for Children I	2.0
ARTS 534	Art Therapy Assessment and Treatment for Children II	2.0
ARTS 535	Art Therapy Theory and Symbolism I	2.0
ARTS 536	Art Therapy Theory and Symbolism II	2.0
ARTS 537	Art Therapy Group Supervision I	1.5
ARTS 538	Art Therapy Group Supervision II	1.5
ARTS 539	Art Therapy Group Supervision III	1.5
ARTS 540	Art Therapy Literature and Research	1.0
ARTS 541	Jungian Psychology for Art Therapists	2.0
ARTS 542	Group Dynamics: Art Therapy	2.0
ARTS 631	Processes and Materials in Art Therapy & Counseling	2.0
ARTS 634	Art Therapy Family Assessment	1.0
ARTS 635	Social and Cultural Foundations in Art Therapy and Counseling	2.0
ARTS 636	Studio Art for Art Therapists	1.5
ARTS 644	Art Therapy Approaches to Trauma Treatment	2.0
ARTS 645	Professional Identity in Art Therapy and Counseling	1.0
ARTS 647	Art Therapy and Counseling Adv Group Supervision I	2.0
ARTS 648	Art Therapy and Counseling Adv Group Supervision II	2.0
ARTS 649	Art Therapy and Counseling Adv Group Supervision III	2.0

Art Therapy Electives — 1.0

Select one of the following:

ARTS 640	Medical Art Therapy	
ARTS 641	Forensic Art Therapy	
ARTS 642	Art Therapy in an Education Setting	

Clinical Education Courses

ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 511	Clinical Practicum II	1.0
ARTS 512	Clinical Practicum III	1.0
ARTS 610	Clinical Internship I	3.0
ARTS 611	Clinical Internship II	3.0
ARTS 612	Clinical Internship III	3.0

Thesis

ARTS 621	Thesis I	1.0
ARTS 622	Thesis II	1.0
ARTS 623	Thesis III	1.0
ARTS 624	Thesis IV	1.0

Additional Electives

ARTS 625	For Thesis Only	
ARTS 699	Independent Study in Creative Arts Therapy	

Total Credits — **90.0**

Sample Plan of Study

Term 1		Credits
ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 504	Human Psychological Development I	2.0
ARTS 505	Clinical Diagnosis of Psychopathology I	2.0
ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 531	Art Therapy Assessment and Treatment for Adults I	2.0
ARTS 533	Art Therapy Assessment and Treatment for Children I	2.0
ARTS 535	Art Therapy Theory and Symbolism I	2.0
ARTS 537	Art Therapy Group Supervision I	1.5
	Term Credits	**15.5**
Term 2		
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 507	Group Dynamics and Therapy	2.0
ARTS 508	Introduction to Behavioral Research I	2.0
ARTS 511	Clinical Practicum II	1.0
ARTS 513	Clinical Diagnosis of Psychopathology II	2.0
ARTS 532	Art Therapy Assessment and Treatment for Adults II	2.0
ARTS 534	Art Therapy Assessment and Treatment for Children II	2.0
ARTS 536	Art Therapy Theory and Symbolism II	2.0
ARTS 538	Art Therapy Group Supervision II	1.5
	Term Credits	**16.5**
Term 3		
ARTS 509	Human Psychological Development II	2.0
ARTS 512	Clinical Practicum III	1.0
ARTS 515	Introduction to Behavioral Research II	2.0
ARTS 539	Art Therapy Group Supervision III	1.5
ARTS 540	Art Therapy Literature and Research	1.0
ARTS 541	Jungian Psychology for Art Therapists	2.0
ARTS 542	Group Dynamics: Art Therapy	2.0
ARTS 636	Studio Art for Art Therapists	1.5
	Term Credits	**13.0**
Term 4		
ARTS 604	Career Counseling	4.0
ARTS 621	Thesis I	1.0
Choose Art Therapy Elective		

ARTS 641	Forensic Art Therapy	
	Term Credits	**5.0**
Term 5		
ARTS 601	Theories of Psychotherapy I	2.0
ARTS 602	Multicultural Perspectives in Therapy I	2.0
ARTS 610	Clinical Internship I	3.0
ARTS 622	Thesis II	1.0
ARTS 631	Processes and Materials in Art Therapy Counseling	2.0
ARTS 644	Art Therapy Approaches to Trauma Treatment	2.0
ARTS 647	Art Therapy and Counseling Adv Group Supervision I	2.0
Choose Art Therapy Elective		1.0
ARTS 640	Medical Art Therapy	
ARTS 642	Art Therapy in an Education Setting	
	Term Credits	**15.0**
Term 6		
ARTS 603	Clinical Appraisal and Assessment I	2.0
ARTS 605	Theories of Psychotherapy II	2.0
ARTS 611	Clinical Internship II	3.0
ARTS 623	Thesis III	1.0
ARTS 634	Art Therapy Family Assessment	1.0
ARTS 635	Social and Cultural Foundations in Art Therapy and Counseling	2.0
ARTS 645	Professional Identity in Art Therapy and Counseling	1.0
ARTS 648	Art Therapy and Counseling Adv Group Supervision II	2.0
	Term Credits	**14.0**
Term 7		
ARTS 606	Professional Orientation and Ethics II	3.0
ARTS 607	Clinical Appraisal and Assessment II	2.0
ARTS 612	Clinical Internship III	3.0
ARTS 624	Thesis IV	1.0
ARTS 649	Art Therapy and Counseling Adv Group Supervision III	2.0
	Term Credits	**11.0**

Total Credit: 90.0

Creative Arts Therapies Department Faculty

Yasmine Awais, ATR-BC, ATCS, LCAT *(Art Institute of Chicago).* Assistant Clinical Professor. Multicultural art therapy, clinical supervision.

Joke Bradt, PhD, MT-BC *(Temple University).* Associate Professor. Research in music therapy, chronic pain, systematic reviews.

Gayle Gates, MA, BC-DMT *(Immaculate Heart College, CA) Associate Director, Dance/Movement Therapy Programs.* Assistant Clinical Professor. Early childhood development and mother-child interaction, intervention with at risk preschoolers.

Nancy Gerber, PhD, ATR-BC, LPC *(Union Institute and University) Director, PhD Program in Creative Arts Therapies.* Associate Clinical Professor. Art therapy assessment; treatment of adolescents, adults and

geriatrics, modern psychoanalysis and art therapy, arts therapy education, doctoral education.

Sharon W. Goodill, PhD, BC-DMT, NCC, LPC *(Union Institute and University) Chair, Department of Creative Arts Therapies.* Clinical Professor. Dance/movement therapy for medically ill patients, mind/body studies, CAT research and leadership.

Florence Ierardi, MM, MT-BC, LPC *(Temple University) Director of Field Education.* Associate Clinical Professor. Effects of percussion playing on the nervous system; rhythm-based assessment models.

Girija Kaimal, EdD, MA *(Harvard University).* Assistant Professor. Art therapy, educational research, program evaluation, art therapy.

Donna H. Kaiser, PhD, ATR-BC, LPC, LMFT *(The College of William and Mary) Director of Art Therapy Programs.* Associate Clinical Professor. Art therapy research, art therapy with clients with substance abuse diagnoses; development of an art therapy assessment for evaluating attachment security.

Paul Nolan, MCAT, MT-BC, LPC *(Hahnemann Medical College) Director of Music Therapy Programs.* Associate Clinical Professor. Music and child development, outcome studies in music therapy; analysis of musical behaviors in music therapy; psychological responses to music therapy.

Ellen Schelly-Hill, MMT, BA *(Antioch NE Graduate School) Director of Dance/Movement Therapy Programs.* Associate Clinical Professor. Adults diagnosed with mood disorders, anxiety, and chronic pain; creative arts in therapy for at-risk adolescents.

Music Therapy and Counseling

Major: Music Therapy and Counseling
Degree Awarded: Master of Arts (MA)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 51.2305
Standard Occupational Classification (SOC) code: 29-1129

About the Program

The two-year music therapy program is designed to help students develop advanced music therapy clinical skills. The program is the only music therapy training model housed in an academic health center. It is unique in that faculty members include mental health and medical professionals who assist students in integrating music therapy with current developmental, neuroscience, mental health, and medical foundations.

Didactic and clinical aspects are balanced to provide a foundation of theoretical knowledge and practical application. The evidence-informed curriculum integrates knowledge of music therapy with current theoretical approaches to assessment and treatment. Experiential core and music therapy modality courses are designed to help students develop the use of the self within the music therapy relationship.

For additional information about program, visit the College of Nursing and Health Professions' Music Therapy (https://www.drexel.edu/cnhp/academics/graduate/MA-Music-Therapy-Counseling) web site.

Degree Requirements

Core Courses

ARTS 501	Introduction to Creative Arts Therapy I	2.0

ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 504	Human Psychological Development I	2.0
ARTS 505	Clinical Diagnosis of Psychopathology I	2.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 509	Human Psychological Development II	2.0
ARTS 513	Clinical Diagnosis of Psychopathology II	2.0
ARTS 519	Neuroscience: Concepts and Applications for Creative Arts Therapy	3.0
ARTS 604	Career Counseling	4.0
ARTS 606	Professional Orientation and Ethics II	3.0
ARTS 507	Group Dynamics and Therapy	2.0
ARTS 508	Introduction to Behavioral Research I	2.0
ARTS 515	Introduction to Behavioral Research II	2.0
ARTS 601	Theories of Psychotherapy I	2.0
ARTS 605	Theories of Psychotherapy II	2.0
ARTS 602	Multicultural Perspectives in Therapy I	2.0
ARTS 603	Clinical Appraisal and Assessment I	2.0
ARTS 607	Clinical Appraisal and Assessment II	2.0
Music Therapy Track Courses		
ARTS 570	Clinical Musicianship I	2.0
ARTS 571	Clinical Musicianship II	2.0
ARTS 572	Clinical Musicianship III	2.0
ARTS 573	Clinical Musical Improvisation I	2.0
ARTS 574	Clinical Musical Improvisation II	2.0
ARTS 575	Theories in Music Therapy I	2.0
ARTS 577	Music Therapy Skills I	2.0
ARTS 578	Music Therapy Skills II: Child Skills	2.0
ARTS 579	Music Therapy Skills III: Technological Applications	2.0
ARTS 580	Psychology of Music	2.0
ARTS 670	Advanced Music Therapy Skills I	2.0
ARTS 671	Advanced Music Therapy Skills II	2.0
ARTS 672	Multicultural Perspectives in Music Therapy	2.0
ARTS 676	Theories in Music Therapy II	2.0
ARTS 677	Advanced Music Therapy Skills III - Group	2.0
ARTS 678	Clinical Internship Laboratory: Musical Analysis	2.0
Clinical Education Courses		
ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 511	Clinical Practicum II	1.0
ARTS 512	Clinical Practicum III	1.0
ARTS 581	Music Therapy Group Supervision I	1.0
ARTS 582	Music Therapy Group Supervision II	1.0
ARTS 583	Music Therapy Group Supervision III	1.0
ARTS 610	Clinical Internship I	3.0
ARTS 611	Clinical Internship II	3.0
ARTS 612	Clinical Internship III	3.0
Thesis		
ARTS 621	Thesis I	1.0
ARTS 622	Thesis II	1.0
ARTS 623	Thesis III	1.0
ARTS 624	Thesis IV	1.0
Additional Electives		

As needed, in consultation with the program director students can select the following electives:

ARTS 625	For Thesis Only	0.0
ARTS 699	Independent Study in Creative Arts Therapy	1.0-4.0
Total Credits		**90.0**

Sample Plan of Study

Term 1		Credits
ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 504	Human Psychological Development I	2.0
ARTS 505	Clinical Diagnosis of Psychopathology I	2.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 570	Clinical Musicianship I	2.0
ARTS 573	Clinical Musical Improvisation I	2.0
ARTS 575	Theories in Music Therapy I	2.0
ARTS 577	Music Therapy Skills I	2.0
ARTS 581	Music Therapy Group Supervision I	1.0
	Term Credits	**17.0**
Term 2		
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 507	Group Dynamics and Therapy	2.0
ARTS 508	Introduction to Behavioral Research I	2.0
ARTS 511	Clinical Practicum II	1.0
ARTS 513	Clinical Diagnosis of Psychopathology II	2.0
ARTS 571	Clinical Musicianship II	2.0
ARTS 574	Clinical Musical Improvisation II	2.0
ARTS 578	Music Therapy Skills II: Child Skills	2.0
ARTS 582	Music Therapy Group Supervision II	1.0
	Term Credits	**16.0**
Term 3		
ARTS 509	Human Psychological Development II	2.0
ARTS 512	Clinical Practicum III	1.0
ARTS 515	Introduction to Behavioral Research II	2.0
ARTS 519	Neuroscience: Concepts and Applications for Creative Arts Therapy	3.0
ARTS 572	Clinical Musicianship III	2.0
ARTS 579	Music Therapy Skills III: Technological Applications	2.0
ARTS 580	Psychology of Music	2.0
ARTS 583	Music Therapy Group Supervision III	1.0
	Term Credits	**15.0**
Term 4		
ARTS 604	Career Counseling	4.0
ARTS 621	Thesis I	1.0
	Term Credits	**5.0**
Term 5		
ARTS 601	Theories of Psychotherapy I	2.0
ARTS 602	Multicultural Perspectives in Therapy I	2.0
ARTS 610	Clinical Internship I	3.0
ARTS 622	Thesis II	1.0
ARTS 670	Advanced Music Therapy Skills I	2.0

ARTS 676	Theories in Music Therapy II	2.0
	Term Credits	**12.0**
Term 6		
ARTS 603	Clinical Appraisal and Assessment I	2.0
ARTS 605	Theories of Psychotherapy II	2.0
ARTS 611	Clinical Internship II	3.0
ARTS 623	Thesis III	1.0
ARTS 671	Advanced Music Therapy Skills II	2.0
ARTS 672	Multicultural Perspectives in Music Therapy	2.0
	Term Credits	**12.0**
Term 7		
ARTS 606	Professional Orientation and Ethics II	3.0
ARTS 607	Clinical Appraisal and Assessment II	2.0
ARTS 612	Clinical Internship III	3.0
ARTS 624	Thesis IV	1.0
ARTS 677	Advanced Music Therapy Skills III - Group	2.0
ARTS 678	Clinical Internship Laboratory: Musical Analysis	2.0
	Term Credits	**13.0**

Total Credit: 90.0

Creative Arts Therapies Department Faculty

Yasmine Awais, ATR-BC, ATCS, LCAT *(Art Institute of Chicago).* Assistant Clinical Professor. Multicultural art therapy, clinical supervision.

Joke Bradt, PhD, MT-BC *(Temple University).* Associate Professor. Research in music therapy, chronic pain, systematic reviews.

Gayle Gates, MA, BC-DMT *(Immaculate Heart College, CA) Associate Director, Dance/Movement Therapy Programs.* Assistant Clinical Professor. Early childhood development and mother-child interaction, intervention with at risk preschoolers.

Nancy Gerber, PhD, ATR-BC, LPC *(Union Institute and University) Director, PhD Program in Creative Arts Therapies.* Associate Clinical Professor. Art therapy assessment; treatment of adolescents, adults and geriatrics, modern psychoanalysis and art therapy, arts therapy education, doctoral education.

Sharon W. Goodill, PhD, BC-DMT, NCC, LPC *(Union Institute and University) Chair, Department of Creative Arts Therapies.* Clinical Professor. Dance/movement therapy for medically ill patients, mind/body studies, CAT research and leadership.

Florence Ierardi, MM, MT-BC, LPC *(Temple University) Director of Field Education.* Associate Clinical Professor. Effects of percussion playing on the nervous system; rhythm-based assessment models.

Girija Kaimal, EdD, MA *(Harvard University).* Assistant Professor. Art therapy, educational research, program evaluation, art therapy.

Donna H. Kaiser, PhD, ATR-BC, LPC, LMFT *(The College of William and Mary) Director of Art Therapy Programs.* Associate Clinical Professor. Art therapy research, art therapy with clients with substance abuse diagnoses; development of an art therapy assessment for evaluating attachment security.

Paul Nolan, MCAT, MT-BC, LPC *(Hahnemann Medical College) Director of Music Therapy Programs.* Associate Clinical Professor. Music and child development, outcome studies in music therapy; analysis of musical behaviors in music therapy; psychological responses to music therapy.

Ellen Schelly-Hill, MMT, BA *(Antioch NE Graduate School) Director of Dance/Movement Therapy Programs.* Associate Clinical Professor. Adults diagnosed with mood disorders, anxiety, and chronic pain; creative arts in therapy for at-risk adolescents.

Master of Family Therapy

Major: Family Therapy
Degree Awarded: Master of Family Therapy (MFT)
Calendar Type: Quarter
Total Credit Hours: 91.0
Classification of Instructional Programs (CIP) code: 51.1505
Standard Occupational Classification (SOC) code: 21.1013

About the Program

The Master of Family Therapy Program prepares couple and family therapy practitioners for clinical practice and is designed to meet the educational requirements for license eligibility in the state of Pennsylvania. It is a two-year full-time degree program and offers part-time evenings options accredited by the Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE).

The program prepares students for the profession of couple and family therapy through academic and clinical training. It exposes students to broad areas of theory and practice and provides an intensive, supervised clinical experience. The program emphasizes the interdependence of individual experience and the relational context, extending from family of origin (including traditional and nontraditional families) to the global community. The program is committed to training students to be aware of and sensitive to cultural diversity. In addition, the person of the therapist, including the student's own culture, is a major aspect of the clinical training.

For more information, visit Drexel's College of Nursing and Health Professions Individual, Couple and Family Therapy Department (https://www.drexel.edu/cnhp/academics/departments/Couple-and-Family-Therapy) web page.

Degree Requirements

The MFT curriculum assists students in integrating theory and practice. Issues of cultural diversity such as race, class, gender, sexual orientation, and ethnicity and power and privilege are addressed throughout the program. Students are fully trained to assume clinical practice in couple and family therapy and meet the educational requirements for Clinical Fellow membership in the AAMFT.

Required Courses

Theoretical Foundations		
CFTP 500	Introduction to Systems Theory	4.0
CFTP 501	Introduction to Family Therapy	4.0
CFTP 503	Historical and Sociocultural Influences	4.0
Clinical Practice		
CFTP 505	Bowen Theory	4.0
CFTP 506	Contextual Theory and Therapy	4.0
CFTP 507	Collaborative Approaches	4.0
CFTP 508	Structural Family Therapy	4.0
CFTP 509	Couples Therapy	4.0

CFTP 510	Sex Therapy	4.0
CFTP 511	Object Relations Theory	4.0
CFTP 512	Behavioral Models of Family Therapy	4.0
CFTP 517	Addictions in The Family	4.0
CFTP 518	Medical Family Therapy	4.0
CFTP 519	Family Violence	4.0
CFTP 537	Nosology & Couple and Family Therapy Practice	4.0
Individual Development and Family Relations		
CFTP 520	Family Life Cycle	4.0
Professional Identity and Ethics		
CFTP 522	Legal and Ethical Implications in Couple and Family Therapy Practice	4.0
Research		
CFTP 525	Research in Couple and Family Therapy	4.0
Additional Learning		
CFTP 526	Person of the Therapist Experience I	2.0
CFTP 527	Person of the Therapist Experience II	2.0
CFTP 528	Person of the Therapist Experience III	2.0
Electives		
CFTP 515	Introduction to Psychopharmacology	
CFTP 521	Human Development	
CFTP 529	Family Policy	
Practicum		
CFTP 530	Practicum I	2.0
CFTP 531	Practicum II	2.0
CFTP 532	Practicum III	2.0
CFTP 533	Practicum IV	1.0
CFTP 534	Practicum V	2.0
CFTP 535	Practicum VI	2.0
CFTP 536	Practicum VII	2.0
Total Credits		**91.0**

Clinical Practicum Experience

All interns must complete a continuous 12-month calendar year experience at one practicum site prior to graduation. Interns will be expected to spend 16-20 hours per week working at the approved program practicum site. Scheduling of specific times will be negotiated by the intern, site supervisor and CFT Director of Clinical Training. The practicum schedule must not conflict with class schedule.

Clinical practicum sites are located primarily in Philadelphia, Delaware, and New Jersey. Settings include addictions facilities, schools, family based and forensic family therapy treatment programs, hospitals, community health centers, juvenile justice treatment systems, and inpatient and outpatient behavioral health agencies.

For additional information, students should contact the Individual, Couple and Family Therapy Department (https://www.drexel.edu/cnhp/academics/departments/Couple-and-Family-Therapy).

Couple and Family Therapy Faculty

Stephanie Brooks, PhD, LCSW, LMFT *(Drexel University) Department Chair and Director, Post-Master's & Medical Family Therapy Certificate Programs*. Associate Clinical Professor. Forensic family therapy, couple and family therapy supervision and training, person of the therapist, racism and stress and couples living with ADHD.

Maureen Davey, MFT, PhD, LMFT *(Syracuse University)*. Associate Professor. Development of culturally sensitive family-based interventions for historically under-served populations.

Kenneth Hardy, PhD *(Florida State University)*. Assistant Clinical Professor. Challenging society to think critically about the hidden but significant connections that often exist between trauma and issues of oppression.

Eric Johnson, PhD, MSW, MDiv *(Rutgers University)*. Assistant Clinical Professor. Families of the mentally ill, forensic family therapy, post-divorce mediation.

Marlene F. Watson, PhD, LMFT *(Virginia Polytechnic and State University)*. Associate Professor. Forensic family therapy, siblings, race, class, gender and health policy issues.

Master of Health Administration

Major: Health Administration
Degree Awarded: Master of Health Administration (MHA)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 51.0701
Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Master of Health Administration program consists of 10 core courses, one on-site residency, and one elective course, for a total of 45.0 credits. All courses, except for the residency, will be conducted online through Drexel University Online (http://www.drexel.com/online-degrees/nursing-degrees/mha). The residency is designed to provide students with a full master's level collaborative experience, with on-campus activities, and the experience of visiting and learning about some of the many healthcare facilities in Philadelphia.

Students will learn the extent of health disparities in urban areas based on current health indices, such as infant mortality rates, life expectancy and violence, and the policy, systems management, and epidemiological tools for addressing these.

The curriculum includes community orientation, financial skills, analytical thinking, and strategic orientation. The community orientation is expressed in the public health approach in courses such as the Introduction to Descriptive Epidemiology and Biostatistics, which is based in the tradition of social epidemiology.

Students collaborate to produce an Applied Management Project which will be assigned in groups as a culminating project for the program. In this project, students will apply management tools and/or research tools to address particular administrative challenges, assuring that students think at an organizational level and use particular strategies to respond to change. Set in Drexel's nationally recognized Center for Interdisciplinary Clinical Simulation and Practice (http://www.drexel.edu/cnhp/about/CICSP), students will be a part of a management scenario with experienced actors and state-of-the-art facilities.

In addition to the content of the workforce course, self-confidence and self-development are integrated in the management courses and the on-campus portion of the program, which encourages self-reflection, application of theoretical perspectives, and synthesis of data and

management tools. In the online portion of the course, students engage in threaded discussions with classmates about their completed projects.

The curriculum is designed to allow a student to graduate in two academic years, by taking two courses in the fall, winter, spring of year one; one course in the fall, two courses winter and spring terms of year two; and one five-day on-site residency. Students can also complete the program in three years by taking one course per term, including the summer term in Year 1 and Year 2. In this option, the five-day residency is in the summer of Year 2.

For additional information, please contact:
Susan Feinstein, BS
Administrative Coordinator
Health Administration Department
267-359-5543
slf52@drexel.edu (%20slf52@drexel.edu)

Degree Requirements

The Master of Health Administration program consists of 10 core courses (37.0 credits), one on-site residency (4.0 credits), and one elective course (4.0 credits), for a total of 45.0 credits.

REQUIRED COURSES

HSAD 500	Historical Influences on the US Healthcare System	4.0
PBHL 701	Introduction to Descriptive Epidemiology and Biostatistics	3.0
HSAD 505	Ethical and Legal Issues in Healthcare Management and Policy	4.0
HSAD 540	Resources, Recruitment and Retention in Healthcare	4.0
RSCH 519	Introduction to Biostatistics	3.0
HSAD 515	Practice issues in Healthcare Management	4.0
HSAD 522	Applied Management Project [*]	4.0
HSAD 530	Politics and Policy of Healthcare Resources	4.0
HSAD 525	National Health Expenditures	4.0
HSAD 550	Planning in the Era of the Affordable Care Act	4.0
PBHL 603	Advanced Healthcare Financial Management	3.0
ELECTIVE COURSES (4 credits from the following list)		4.0
HSAD 560	Advanced Healthcare Marketing	
HSAD 561	Risk Management	
HSAD 562	Group Dynamics in Health Care Management	
HSAD 565	Global Health and Management Issues	
Total Credits		**45.0**

[*]   HSAD 522 is taken during the first week of Summer term.

Sample Plan of Study

Term 1		Credits
HSAD 500	Historical Influences on the US Healthcare System	4.0
PBHL 701	Introduction to Descriptive Epidemiology and Biostatistics	3.0
	Term Credits	**7.0**
Term 2		

HSAD 505	Ethical and Legal Issues in Healthcare Management and Policy	4.0
HSAD 540	Resources, Recruitment and Retention in Healthcare	4.0
	Term Credits	**8.0**
Term 3		
RSCH 519	Introduction to Biostatistics	3.0
HSAD 515	Practice issues in Healthcare Management	4.0
	Term Credits	**7.0**
Term 4		
HSAD 522	Applied Management Project	4.0
	Term Credits	**4.0**
Term 5		
HSAD 530	Politics and Policy of Healthcare Resources	4.0
	Term Credits	**4.0**
Term 6		
HSAD 525	National Health Expenditures	4.0
HSAD 550	Planning in the Era of the Affordable Care Act	4.0
	Term Credits	**8.0**
Term 7		
PBHL 603	Advanced Healthcare Financial Management	3.0
ELECTIVE COURSES-4 CRS. FROM THIS LIST		4.0
HSAD 560	Advanced Healthcare Marketing	
HSAD 561	Risk Management	
HSAD 562	Group Dynamics in Health Care Management	
HSAD 565	Global Health and Management Issues	
	Term Credits	**7.0**

Total Credit: 45.0

Health-Services Administration Faculty

Michael Dahnke, PhD *(Temple University)*. Assistant Clinical Professor. Health-care ethics, religion and health care, and media and health care.

David Hume Flood, PhD *(University of Pennsylvania) Health Services Administration Program*. Professor. Medical humanities: an examination of topics in medicine and health care from the perspectives of literature, the arts, and medical ethics.

Stephen F. Gambescia, PhD, MEd, MBA *(Temple University) Assistant Dean of Academic and Student Affairs*. Associate Clinical Professor. Health care policy, nonprofits and health care, and health care management and leadership.

Willard Poole Green, PhD *(Temple University)*. Professor. Medical ethics, including the role of patient autonomy in the patient-health professional relationship and the interface with medical paternalism; the barriers to informed consent and strategies to overcome them; and the importance of confidentiality in t

Kristine A. Mulhorn, PhD *(University of Delaware) Chair, Department of Health Administration*. Assistant Professor. Disablity and aging; cross-national methods of functioning.

Constance Karin Perry, PhD, EMT *(University of Buffalo)*. Associate Professor. Biomedical ethics and ethical theory. Research interests

include autonomy, personhood, feminist ethics, the ethics of animal experimentation, and ethical issues in reproduction and pregnancy.

Michelle Sahl, PhD, MEd, MBA, MBE *(The University of the Sciences in Philadelphia).* Assistant Teaching Professor. Health management and policy: management and leadership of health services organizations, urban health, and the history of health care systems.

Spencer R. Ward, PhD *(University of Nebraska).* Assistant Professor. The use of behavioral techniques to reduce performance anxiety, improve the knowledge acquisition process and promote distance-learning models.

Physician Assistant (PA) Certificate

Major: Physician Assistant
Degree Awarded: Master of Health Sciences (MHS)
Calendar Type: Quarter
Total Credit Hours: 119.0
Classification of Instructional Programs (CIP) code: 51.0912
Standard Occupational Classification (SOC) code: 29-1071

About the Program

The Drexel University Physician Assistant Program provides graduates with a Master of Health Science degree with Physician Assistant Certificate, and eligibility to sit for the PANCE (Physician Assistant National Certifying Examination).

The physician assistant (PA) is a primary health care provider who, when graduated from an accredited program and national certified and state-licensed, is eligible to practice medicine with the legal supervision of a physician.

PAs perform many duties including, but not limited to, physical examinations, diagnosis and treatment of illnesses, ordering and interpretation of lab tests, assist in surgery, perform procedures, perform hospital rounds, prescribe medicines and provide patient education.

The mission of this program is to:

- Educate qualified primary care physician assistants
- Improve health care delivery in rural and urban medically under served areas
- Promote the physician assistant profession

Additional Information

For more information about this program, contact: paadmissions@drexel.edu

For more details about the program, visit the College of Nursing and Health Professions Physician Assistant (https://www.drexel.edu/cnhp/academics/graduate/MHS-Physician-Assistant) page.

Degree Requirements

The intensive curriculum consists of professionally related coursework taken during a continuous period (the part-time option requires an additional calendar year) and gives students an understanding of both the health care system within which they will work and the functions appropriate to the role of the physician assistant. The curriculum is divided

into a full year of didactic courses followed by an additional 15 months of supervised clinical practice.

Training begins with four quarters of didactic education which integrates patient interaction throughout. The clinical training phase consists of six (6) five-credit, five week clinical rotations in medicine, surgery, women's health, pediatrics, emergency medicine, and psychiatry. The clinical phase of the curriculum is completed on a full-time basis for both full and part-time students.

The final portion of the curriculum consists of two, 10-credit quarter-long, primary care practica (preceptorships). During the preceptorship phase, each student is assigned to two primary care sites for individualized clinical training with physician preceptors. Training sites during the clinical year are located throughout Pennsylvania and in other states. Students are expected to relocate during the clinical phase and are responsible for all associated financial costs, including transportation and living expenses.

The program is intensely challenging, both intellectually and physically, and requires stamina as well as personal and financial sacrifice on the part of the students. The program demands a high degree of integrity, self-sufficiency, motivation, and self-discipline, and highly developed study skills.

The Physician Assistant program utilizes electronic documentation and communications. Therefore, all students are required to have laptop computers with Web access capability.

Contact the Physician Assistant Program (https://www.drexel.edu/cnhp/academics/graduate/MHS-Physician-Assistant) for more information on the sequencing for the part-time option.

Required Courses

First Year

Fall

		Credits
PA 540	Clinical Anatomy	5.0
PA 545	Physician Assistant Practice	1.0
PA 543	Ethical Issues in Physician Assistant Practice	2.0
PA 542	Patient Communication	2.0
PA 544	Clinical Assessment	5.0
	Term Credits	**15.0**

Winter

In this quarter, part-time students may take PA 546 Health Policy for Physician Assistance Practice and/or an elective in addition to the required courses. This will enable them to take the first summer quarter off. addition to the required courses.

PA 548	Principles of Medical Science I	2.0
PA 556	Clinical Medicine I	5.0
PA 551	Pharmacology and Therapeutics I	3.0
PA 559	Clinical Skills I	2.0
PA 547	Evidence Based Medicine for Physician Assistants	3.0
	Term Credits	**15.0**

Spring

PA 549	Principles of Medical Science II	2.0
PA 557	Clinical Medicine II	5.0
PA 552	Pharmacology and Therapeutics II	2.0
PA 560	Clinical Skills II	2.0

PA 554	Biopsychosocial Issues in Patient Care	5.0
	Term Credits	**16.0**

Summer

In this quarter, part-time students may take PA 546 Health Policy for Physician Assistant Practice plus an elective if they wish to attend during the summer quarter.

PA 550	Principles of Medical Science III	2.0
PA 558	Topics in Clinical Practice	5.0
PA 553	Pharmacology and Therapeutics III	2.0
PA 561	Clinical Skills III	4.0
PA 546	Health Policy for Physician Assistant Practice	2.0
	Term Credits	**15.0**

Second Year

Fall

The Clinical Phase (Full-time for all students, 5 quarters)

Rotation I		5.0
Rotation II		5.0
	Term Credits	**10.0**

Winter

Rotation III		5.0
Rotation IV		5.0
Graduate Project I		3.0
	Term Credits	**13.0**

Spring

Rotation V		5.0
Rotation VI		5.0
	Term Credits	**10.0**

Third Year

Summer

PA 635	Primary Care Practicum I	10.0
PA 638	Graduate Project II	3.0-6.0
	Term Credits	**13.0-16.0**

Fourth Year

Fall

PA 637	Primary Care Practicum II	10.0
	Term Credits	**10.0**

Total Credit: 117.0-120.0

*Clinical Year Rotation Courses

The sequencing of the six clinical rotations will vary for individual students, but all students must take all six rotations.

PA 629	Medicine Rotation	5.0
PA 630	Pediatrics Rotation	5.0
PA 631	Obstetrics and Gynecology Rotation	5.0
PA 632	Psychiatry and Behavioral Health Rotation	5.0
PA 633	Surgery Rotation	5.0
PA 634	Emergency Medicine Rotation	5.0

Admission Requirements

The Drexel University Physician Assistant Program utilizes the Central Application Service for Physician Assistants (CASPA). All applicants must complete the CASPA application process no later than October 1st of the year prior to expected date of matriculation. Applications must be e-submitted, complete (including the receipt by CASPA of all transcripts, reference forms, and other supporting documentation such as foreign transcript evaluations and TOEFL score) and verified by CASPA by the October 1st deadline. Applicants may not apply directly to the Drexel University Physician Assistant Program. Applications made directly to the Office of Enrollment Management (Admissions) of Drexel University will not be processed.

- For the 2015-2016 admissions cycle, applications must be verified by CASPA no later than October 1st, 2015.
- Applications remaining unverified by CASPA for any reason after the October 1st deadline will not be processed.

For additional details about the application process, visit the Physician Assistant Program's Admissions (https://www.drexel.edu/cnhp/academics/graduate/MHS-Physician-Assistant) web page.

Application Prerequisites

- A minimum grade point average of 3.0 on a 4.0 grading scale from all colleges and universities attended is required for the following three (3) categories: non-science courses, natural science courses, and combined overall courses. Applications will not be reviewed unless the applicant has attained these minimum requirements at time of application.
- Meet the technical standards for admission, progression, and graduation from the Physician Assistant Program. Each applicant is expected to review completely the "Technical Standards for PA Program" PDF at the end of this page. Individuals unable to meet these technical standards, with or without reasonable accommodation, are counseled to pursue alternate careers.
- Official transcripts from all colleges and universities attended sent directly to CASPA.
- Non-United States-based educational institutional transcripts must be evaluated by an approved agency (see the listing of acceptable agencies on the CASPA website at https://portal.caspaonline.org/faq/foreign_transcripts.htm). Evaluation fees are the responsibility of the applicant. Evaluations must be sent directly to CASPA.
- Three completed reference forms with accompanying letters of recommendation attached and submitted as part of the official CASPA application. Preferred references are from individuals who have interacted with the applicant in a supervisory capacity or academic instructors who have personal knowledge of the applicant. Submission of references from friends, relatives, personal physicians, or instructors who do not possess a personal, supervisory knowledge of the applicants is discouraged.
- A personal statement recorded as part of the CASPA application.
- An applicant whose native language is not English must submit scores from the TOEFL iBT examination unless the applicant has graduated with a bachelor's degree from a U.S. college or university. The minimum required score for the iBT (Internet Based Testing) is 79 and a minimum score of 26 is required for the speaking component. Find more detailed information at http://www.toeflgoanywhere.org/. Scores must be submitted directly to CASPA.

- Meet the minimum prerequisite coursework as detailed in the "Admission Requirements and Process" PDF below.

A minimum of 500 hours of clearly documented volunteer/paid direct hands-on patient contact accrued by the time of application and recorded as part of the official CASPA application is required. Ensure that all hours are accurately reported. Applicants may list the same position in multiple sections in order to account for multiple experiences (patient contact, related health care, research, shadowing, etc.) accrued in the same position as long as each hour is not reported in more than one experience category. Please review the "Patient Contact" PDF below for more information regarding acceptable forms of patient contact.

- Graduate Record Examination (GRE) scores are not required.
- The Physician Assistant Program does not grant advanced standing.

Physician Assistant Faculty

Patrick C. Auth, PhD, PA-C *(Drexel University) Department Chair, Physician Assistant Department*. Clinical Professor. Clinical reasoning of physician assistant students.

Adrian Banning, MMS, PA-C *(Arcadia University)*. Assistant Clinical Professor. Dermatology, family practice, and evidence based medicine.

Geraldine A. Buck, DrPH, MHS, PA-C *(Drexel University) Director, Physician Assistant Post-Professional Master's Program*. Associate Teaching Professor. Public health.

M. Rebecca Buckley, MHS, PA-C *(Drexel University) Associate Director of Clinical Education*. Assistant Clinical Professor. Psychiatry.

Rosalie Coppola, MHS, PA-C *(Drexel University)*. Associate Clinical Professor. Standardized patients, simulation, clinical assessment and pharmacology.

G. John DiGregorio, MD, PhD *(Hahnemann University) Medical Director of the Hahnemann Physician Assistant Program*. Professor. Pharmacology.

Ellen D. Feld, MD, FACP *(University of Cincinnati, College of Medicine)*. Associate Clinical Professor. Clinical medicine and ethical issues.

Gretchen L. Fox, MMSc, PA-C *(St. Francis College) Associate Program Director*. Associate Clinical Professor. Internal medicine/family practice.

Juanita Gardner, MPH, PA-C *(Drexel University)*. Assistant Clinical Professor. Primary care and global health.

Julie Kinzel, MEd, PA-C *(Temple University)*. Assistant Clinical Professor. Long term care experiences, geriatrics, gastroenterology and liver disease.

Daniela C. Livingston, PA-C, MD *(Medical School, Bucharest, Romania; University of Washington, Seattle)*. Assistant Clinical Professor. Pediatrics, primary care and working with underserved populations, with a special emphasis on preventative pediatrics.

Ann McDonough Madden, MHS, BS, PA-C *(Drexel University)*. Clinical Instructor. Healthcare disparities, urban health.

Nina Multak, MPAS, PA-C *(University of Nebraska)*. Associate Clinical Professor. Human patient simulators, standardized patients and healthcare informatics.

Diana D. Smith, MHS, PA-C *(Drexel University)*. Clinical Instructor. Primary care and international health care; distance education.

Charles Stream, MPH, PA-C *(George Washington University)*. Assistant Clinical Professor. Clinical assessment and skills.

Human Nutrition

Major: Human Nutrition
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 30.1901
Standard Occupational Classification (SOC) code: 29-1031

About the Program

The human nutrition major is designed to provide the didactic coursework necessary to prepare students to address the nutrition needs of individuals or groups, through prevention or management of illness or chronic disease. This major also encompasses nutrition science, the application of the principles of biochemistry, physiology, and biology to human nutritional needs. The major includes two tracks; the Didactic Program in Dietetics (DPD) track leading to becoming a registered dietitian nutritionist (RDN), and the Nutrition Sciences track leading to application in research or industry. Applicants to the program should indicate to which track they are applying.

Current research in human nutrition includes: the prevention of obesity and diabetes across the lifespan; community engagement to improve healthful food access, availability, and exposure in school and clinic-based settings; nutrition misinformation in the areas of diabetes, oncology and weight control; and effectiveness of nutrition education (particularly by the use of multimedia) on health and eating habits.

Current research in nutrition science includes: dopamine-mediated mechanisms of food intake regulation in humans and its impact on metabolic homeostasis, especially as it applies to obesity, eating disorders and aging; the relationship between human exposure to pesticides and oxidative stress by measuring biomarkers of oxidative stress in biological fluids and DNA damage in human cells; identifying potential unique food safety risks for minority racial/ethnic and low income populations; and, understanding whether novel dietary interventions can influence bone-regulating hormones, bone mineral density, pro-inflammatory cytokines and energy metabolism.

Graduate study in human nutrition is offered on both a full-time and part-time basis. Students are admitted only in the Fall or Winter terms. Students in the DPD track are required to complete a comprehensive exam at the end of the first year of study, and have the option to complete a research thesis. Students in the Nutrition Sciences track are required to complete a research thesis. In addition to the core curriculum, students select specialty courses relating to their major, as well as electives.

Visit the College's MS in Human Nutrition web page (https://www.drexel.edu/cnhp/academics/graduate/MS-Human-Nutrition) for more information.

Program Prerequisites

The Human Nutrition program builds on a fundamental background in human behavior, written communication, and the sciences of biology, chemistry, physiology and nutrition.

Applicants may apply to the program at any point in time while completing prerequisites. However, if they are accepted, all prerequisite courses must be completed with a grade of B or better before students may enroll in the program.

- 1 year English composition and/or literature
- 1 semester general biology with lab to include cells and genetics
- 2 semesters general chemistry with lab, OR, 1 semester general chemistry with lab AND 1 semester organic chemistry with lab
- 1 semester upper-level (300-400 level) biochemistry
- 1 semester human physiology, OR, 2 semesters anatomy & physiology with lab
- 1 semester general psychology
- 1 semester statistics
- 1 semester nutrition

In addition, students completing the DPD track will be required to complete the following 2 courses either before entry to the program or while completing the degree program in order to receive a DPD verification statement.

- 1 semester basic food preparation (DPD track only)
- 1 semester quantity foods (DPD track only)

Degree Requirements - Nutrition Sciences Track

Students are required to complete 21.0 credits of CORE courses and then select 24.0 credits of electives chosen from courses currently offered in Biology, Nutrition, Food Science, Environmental Science or Public Health after consulting with their advisor. Those students choosing the thesis option substitute 6 credits of research for two elective courses. Those students choosing the non-thesis option are required to pass a comprehensive exam before being granted their MS.

There are two tracks available for the MS in Human Nutrition.

The DPD track provides the coursework necessary to fulfill the didactic requirements of the Accreditation Council for Education in Nutrition and Dietetics (ACEND) for eligibility to become a registered dietitian.

The Nutrition Science track provides a foundation in the science of nutrition for those who are planning to pursue research, doctoral studies, or who are already a registered dietitian.

Students in both tracks are required to successfully complete a comprehensive exam or research thesis prior to graduation.

Degree Requirements - Didactic Program in Dietetics (DPD) Track

The Didactic Program in Dietetics (DPD) (https://www.drexel.edu/cnhp/academics/graduate/MS-Human-Nutrition) provides the coursework that is required to become a Registered Dietitian/Nutritionist (RD/RDN). Students who want to become an RD/RDN must successfully complete coursework approved by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics (AND). Drexel University was one of the first universities in the country to offer the DPD program on the graduate level. In 2022, all newly credentialed RD/RDN will be required to have a graduate degree.

The MS in Human Nutrition with the DPD option is a full- or part-time program with courses offered in the evening. The program is 45.0 credits

with a written comprehensive exam and may be completed in 18 months to two years with full-time study. Students who enroll part time typically complete the program in three to four years. After completing the MS in Human Nutrition, students participating in this program will also receive a Verification Statement which shows successful completion of the DPD and allows them to apply for an accredited supervised practice experience (dietetic internship).

Required Courses

FDSC 506	Food Composition & Behavior	3.0
NFS 510	Profession of Dietetics	3.0
NFS 525	Nutritional Assessment Through the Life Cycle	3.0
NFS 530	Macronutrient Metabolism	3.0
NFS 531	Micronutrient Metabolism	3.0
NFS 543	Medical Nutrition Therapy I	3.0
NFS 544	Medical Nutrition Therapy II	3.0
NFS 545	Nutrition in Critical Care	3.0
NFS 546	World Nutrition	3.0
NFS 601	Research Methods	3.0
NFS 630	Nutrition Counseling	3.0
NFS 550	Foodservice Systems Management	3.0
NFS 690	Community Nutrition	3.0
NFS 849	Readings in Therapeutic Nutrition	3.0
Elective		3.0
Total Credits		**45.0**

Nutrition Sciences Faculty

Nyree Dardarian, MS, RD, LDN *(Drexel University) Nutrition and Foods. Director, Center for Integrated Nutrition & Performance; Coordinator, Individualized Supervised Practice Pathway.* Instructor. Energy expenditure.

Angelo Del Parigi, MD *(University of Bari, Italy) Courtesy Appointment.* Visiting Research Professor.

Beth L. Leonberg, MS, MA, RD *(Colorado State University, Rowan University) Director, Didactic Program in Dietetics .* Instructor. Pediatric nutrition.

Brandy-Joe Milliron, PhD *(Arizona State University).* Assistant Professor. The development and evaluation of modifications in the natural environment to promote healthier living; farm to table school initiatives;

Donna H. Mueller, PhD *(Temple University) Registered Dietitian, Nutrition and Foods.* Associate Professor. Clinical nutrition; pediatric nutrition; nutrition in pulmonary diseases, especially cystic fibrosis; nutrition in developmental delay; dental nutrition; dietetic education and professional development.

Juan Muniz, PhD *(Oregon State University) Laboratory Manager.* Assistant Research Professor. Food microbiology; community-based research to assess pesticide levels in homes; prevention of health effects of pesticides for indigenous farmworkers.

Jennifer Nasser, PhD *(Rutgers University).* Associate Professor. Dopamine-mediated mechanisms of food intake regulation in humans and its impact on metabolic homeostasis, especially as it applies to obesity, eating disorders and aging.

Jennifer Quinlan, PhD *(North Carolina State University)*. Associate Professor. Food microbiology; microbiological quality and safety of produce, dairy and meat products in markets in high vs. low socioeconomics areas, Bacillus and Clostridium spores in food processing.

Barry Ritz, PhD *(Drexel University) Courtesy Appointment.* Visiting Research Professor.

Vicki Schwartz, MS *(Drexel University) Nutrition and Foods.* Assistant Clinical Professor. Advanced nutrition, clinical nutrition, nutrition support.

Alison Ventura, PhD *(Pennsylvania State University)*. Assistant Professor. Factors that contribute to the development of eating behaviors and dietary preferences during infancy and early childhood.

Stella Lucia Volpe, PhD, RD, LDN, FACSM *(Virginia Polytechnic Institute and State University) Chair, Nutrition Sciences.* Professor. Prevention of obesity and diabetes across the lifespan; mineral metabolism and exercise; energy balance; sports nutrition.

Interdepartmental Faculty

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC *(New York University, School of Education, Division of Nursing)*. Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Michael Lowe, PhD *(Boston College)*. Professor. Prevention and treatment of eating disorders and obesity; effects of appetitive responsiveness and dietary restraint on eating regulation; psychobiology of obesity-proneness; empirical foundations of unconscious processes.

Margaret O'Neil, PT, PhD, MPH *(MCP Hahnemann University; Duke University; University of North Carolina at Chapel Hill)*. Associate Professor. Measurement of and interventions to improve physical activity and fitness levels and promote participation in children and youth with who are overweight/obese and those with physical disabilities (especially cerebral palsy).

Patricia A. Shewokis, PhD *(University of Georgia)*. Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalograpy (EEG) and methodology and research design.

Nursing Education and Faculty Role Post-Bachelor's Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's Degree
Certificate Type: Post Baccalaureate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.5817
Standard Occupational Classification (SOC) Code:12-1072

This program provides a four-course grouping of classes that focus on knowledge and skills required for healthcare provider education roles. Courses are chosen from the MSN in Nursing Education and Faculty Role curriculum. Upon completion of this certificate program, the student will have 12.0 graduate credits from an NLN/CCNE-approved master's in nursing program.

Course List
Required Courses

NURS 591	Foundations of Nursing Education	3.0
NURS 606	Curriculum Design for Higher Level Cognition	3.0
NURS 615	Assessment, Measurement and Evaluation	3.0
Select one of the following:		3.0
NURS 613	The Role and Responsibility of the Nursing Professor	
or NURS 616	Teaching Methods in Nursing Education	
Total Credits		**12.0**

For more information about this program, contact:

Mr. Redian Furxhiu
rf53@drexel.ed (fr53@drexel.ed)
215.762.3999

Pediatric Acute Care Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's
Number of Credits to Completion: 39.0; 800 clinical hours
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3809
Standard Occupational Classification (SOC) Code: 29-1171

About the Program

The Pediatric Acute Care Nurse Practitioner Certificate is an elite post-graduate program that prepares students to deliver advanced care to infants, children and adolescents with acute, critical, and complex health conditions. Students will build upon primary care experience through courses that emphasize evidence-based practice, interdisciplinary collaboration, and the critical use of new technology. The program's curriculum was developed and is taught by Drexel University's renowned faculty from the nationally ranked College of Nursing and Health Professions.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.
- A copy of your current PALS certification

- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.
- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.
- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.
- Applicants seeking admission into the Pediatric Acute Care Nurse Practitioner Post-Master's Certificate Program must complete 800 clinical practicum hours. Accepted students will need to be issued a Pennsylvania RN license in addition to their current RN license if it is not from Pennsylvania
- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.
- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibility for previously faculty supervised clinical hours. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.
- A personal interview may be required (online or telephone options will be available).

Required Courses

Support Courses

NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0

Clinical Courses

NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
NURS 649	Ped Nurse Pract AC I:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 650	Ped Nurse Pract AC II:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 651	PNP Management of the Medically Fragile and Technology Dependent Child in the Community	5.0
Total Credits		**39.0**

Pediatric Primary Care and Pediatric Acute Care Dual Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Graduate
Number of Credits to Completion: 44.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3809
Standard Occupational Classification (SOC) Code: 29-1171

The online Pediatric Primary Care and Pediatric Acute Care Dual Nurse Practitioner Post Master's Certificate program prepares students for advanced nursing roles as clinicians, educators, researchers, and leaders in pediatric health and wellness. Students will also become experts in delivering care to infants, children, and adolescents with acute and complex health disorders. The program's curriculum was developed and is taught by Drexel University's renowned faculty from the nationally ranked College of Nursing and Health Professions (http://drexel.edu/cnhp).

The certificate's curriculum emphasizes evidence-based practice, interdisciplinary collaboration, and the critical use of new technology. Nurse practitioners specializing in pediatric primary and acute care will be able to meet the health care needs required by children and families with acute and chronic, complex care with a promotion of optimal wellness.

On-Campus Requirements

This is a high-quality certificate program that demands a major commitment of time by advanced practice nurses. Because students are being educated to diagnose and treat patients, the program was designed to combine the convenience of online learning with the necessary rigor to become a highly competent and confident Pediatric Primary Care and Acute Care Nurse Practitioner upon graduation. Thus, while most courses are offered online, some facets of the program do require on-campus visits and clinical practicum rotations.

During enrollment in their clinical coursework, students are required to attend one-to-two day campus intensive experiences. Students will participate in simulated clinical learning experiences conducted in CNHP's state-of-the-art, multidisciplinary patient simulation lab. These visits allow

professors to offer students direct support, guidance, and mentoring while providing students with the opportunity to interact with faculty members and collaborate with peers.

Admission Requirements

- A completed application
- A masters degree in nursing from a CCNE or NLN accredited program with a Graduate GPA of 3.0 or above
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Transcripts must be supplied regardless of the number of credits earned or the type of school attended. Instead of hard copy transcripts, post-secondary institutions can supply official electronic transcripts directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com (%20customerservice@drexel.com)). If all post-secondary institutions are not listed on the application and these appear on transcripts received from other institutions, applications will not be reviewed until the remaining transcripts have been submitted. Use Drexel's Transcript Lookup Tool to assist with contacting your previous institutions.
- Two letters of recommendation. Use Drexel's electronic letter of recommendation service. If a recommender prefers to submit an original, hard copy letter, it must include an ink signature and be submitted in a sealed envelope.
- Personal statement (800 - 1600 words) that will give the admissions committee a better understanding of:
  - Why this particular program of study is being chosen
  - Plans upon completion of the certificate
  - How current work experience will enhance program experience
- Resume/CV
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse and any advanced practice nursing licensure and certification documents. License verification from your nursing license registry website is acceptable.
- A copy of your current PALS certification
- Additional requirements for International Students

Program Requirements

NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
NURS 647	PNP III: Management and Care of Adolescents in the Primary Care Setting	5.0
NURS 649	Ped Nurse Pract AC I:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 650	Ped Nurse Pract AC II:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
NURS 651	PNP Management of the Medically Fragile and Technology Dependent Child in the Community	5.0

NURS 664	Professional Issues for Nurse Practitioners	1.0
Total Credits		**44.0**

Sample Plan of Study

Term 1		Credits
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
	Term Credits	**7.0**
Term 2		
NURS 646	Pharmacology for the Pediatric Nurse Practitioner	3.0
	Term Credits	**3.0**
Term 3		
NURS 550	Advanced Clinical Assessment Diagnostic Reasoning Across the Lifespan	4.0
	Term Credits	**4.0**
Term 4		
NURS 642	PNP I: Primary Care of Infants, Children and Adolescents	5.0
	Term Credits	**5.0**
Term 5		
NURS 643	PNP II: Episodic Care of Infants, Children and Adolescents in Primary Care	5.0
	Term Credits	**5.0**
Term 6		
NURS 647	PNP III: Management and Care of Adolescents in the Primary Care Setting	5.0
	Term Credits	**5.0**
Term 7		
NURS 649	Ped Nurse Pract AC I:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
	Term Credits	**5.0**
Term 8		
NURS 650	Ped Nurse Pract AC II:Acute-Chronic Care of Infants, Children and Adolescents Management	5.0
	Term Credits	**5.0**
Term 9		
NURS 651	PNP Management of the Medically Fragile and Technology Dependent Child in the Community	5.0
	Term Credits	**5.0**

Total Credit: 44.0

PhD in Creative Arts Therapies

Major: Creative Arts Therapies
Degree Awarded: Doctor of Philosophy
Calendar Type: Quarter
Total Credit Hours: 66.0
Classification of Instructional Programs (CIP) code: 51.2399
Standard Occupational Classification (SOC) code: 29-1129

About the Program

The Creative Arts Therapies programs are based on specialized didactic and clinical education in art therapy, dance/movement therapy or music therapy. Admission criteria are specific to each of the three areas of concentration

The curriculum contains core courses for all students in areas related to mental health sciences, creative arts in therapy theory and specialized courses for students of each arts therapy modality. The Department of Creative Arts Therapies offers both an MA degree with specialization as well as a PhD degree in Creative Arts Therapies.

The Creative Arts Therapies (https://www.drexel.edu/cnhp/academics/ departments/Creative-Arts-Therapies) programs integrate knowledge of the creative arts therapies with current theoretical and practical approaches to assessment and treatment in mental health, medical, and educational contexts. Academic, clinical, and supervisory aspects are balanced and integrated, with an emphasis on developing competent and compassionate professionals who will contribute to our multicultural society in meaningful and creative ways. The programs are unique in that the faculty includes both creative arts therapists and mental health professionals with an interest in the arts who help students integrate the specialized creative arts therapy knowledge with trends and discoveries in the social and health sciences.

Admission criteria are specific to each of the three areas of concentration. For information about how to apply to the MA program, visit the Drexel University Admissions MA in Creative Arts Therapies (http:// www.drexel.edu/grad/programs/cnhp) page.

PhD in Creative Arts Therapies

The PhD in Creative Arts Therapies program is a research degree for art therapists, dance/ movement therapists, and music therapists who are interested in focusing their careers on scholarly pursuits and academic leadership in their specific discipline. The primary mission of the program is the cultivation of scholars and academic leaders for the purpose of generating and disseminating substantive, quality research that ultimately contributes to the bodies of knowledge, best clinical practices, and the efficacy of the arts therapies fields.

The mission of the PhD in Creative Arts Therapies program is to cultivate stewards of the professions who can preserve the traditions of the disciplines, promote scholarly and clinical advancement, and contribute to the legitimization of the fields. In pursuit of the program mission, the innovative curriculum includes four interactive learning modules that comprise a three-year full-time degree program:

- Interdisciplinary module
- Research module
- Self/other artistic module
- Practicum module

The learning culture, curriculum, and pedagogy of the PhD in Creative Arts Therapies are the primary components contributing to the comprehensiveness of this advanced research degree. The learning culture is one of creativity, innovation, initiative and support. The curriculum and pedagogy emphasize the interaction between intellectual, emotional, inter-subjective and artistic learning for the purpose of generating knowledge in the arts therapies.

The learning culture, curriculum and pedagogy are elaborated in the following constructs:

- A learning culture that supports the exploration and integration of intellectual, emotional, artistic, and self/other knowledge as parallel to the psychotherapeutic and creative processes.
- An educational philosophy, curricular structure, and innovative pedagogy which supports dynamic and creative inquiry into interdisciplinary and discipline specific bodies of knowledge.
- A comprehensive approach to traditional and innovative research methods that best support the ontological, epistemological, theoretical,and applied practice in the arts therapies.
- The integration of theoretical, experiential, and pragmatic knowledge.
- A dialectic between didactic, intrinsic, and practical learning experiences.
- The cultivation of aptitudes and competencies in intellectual, subjective, inter-subjective and artistic inquiry for each student.

For additional information about the program, visit the College of Nursing and Health Professions' PhD in Creative Arts Therapies (https:// www.drexel.edu/cnhp/academics/doctoral/PHD-Creative-Arts-Therapies) web site.

General Requirements

The following general requirements must be satisfied in order to complete the PhD in Creative Arts Therapies:

- 66.0 quarter credits of required courses
- Candidacy/Qualifying exam (administered after the completion of one year or 45 quarter credits)
- Approval of dissertation proposal
- Practicum in one of the following: teaching, research, clinical supervision or advanced clinical practice
- Completion of dissertation
- Final oral exam/oral defense of dissertation

The required courses in the curriculum are organized into four essential learning modules: 1) interdisciplinary; 2) research; 3) self/other and artistic knowledge; and 4) practical application. These courses comprise the key components of the doctoral program, along with the dissertation.

Interdisciplinary Seminars

ARTS 703	Interdisciplinary Seminar I	3.0
ARTS 704	Interdisciplinary Seminar II	3.0
ARTS 705	Interdisciplinary Seminar III	3.0
ARTS 706	Interdisciplinary Seminar IV	3.0
Research Courses		
ARTS 712	Research I: Philosophy & Theory	3.0
RSCH 770	Foundations in Research Methods	3.0
ARTS 714	Research Methods III: Qualitative Methods	3.0
ARTS 715	Innovative and Emergent Research Methods (RSCH 770 is eliminated because it is not yet an approved course. This course will be active next year.)	3.0
RSCH 759	Foundations of Biostatistics	3.0
Research Specialization		
Select one of the following:		3.0
ARTS 732	Advanced Quantitative Research Seminar	

ARTS 733	Advanced Qualitative Research Seminar	
ARTS 734	Innovative and Emergent Research Methods II	
Self/Other Artistic Knowledge Studio Labs		
ARTS 716	Studio Based Artistic Inquiry I	3.0
ARTS 717	Studio Based Artistic Inquiry II	3.0
ARTS 718	Studio Based Artistic Inquiry III	3.0
ARTS 719	Studio Based Artistic Inquiry IV	3.0
Pratical Application Courses		
Practica in either research, teaching, clinical supervision, or advanced clinical practice.		
ARTS 808	Practicum I	3.0
ARTS 809	Practicum II	3.0
ARTS 810	Practicum III	3.0
Dissertation Courses [*]		
Select 9 credits from the following variable credit courses:		9.0
ARTS 804	Dissertation Research I	
ARTS 805	Dissertation Research II	
ARTS 806	Dissertation Research III	
ARTS 807	Dissertation Research IV	
Electives		
Students, with advisement and in accordance with their educational plan, can choose to take two electives in the same content area, or may choose to take one elective each in two different content areas.		6.0
Total Credits		**66.0**

[*]   The dissertation is an original research project, the content of which directly relates to the epistemology, theory, and/or practice of the student's creative arts therapy specialization.

All electives must be graduate courses and can be selected from those courses offered at Drexel University. In particular, doctoral level courses in the College of Nursing and Health Professions, School of Public Health, College of Arts and Sciences, and/or the School of Education may be the most relevant to students in this program. (The Creative Arts Therapies PhD program director will obtain permission for the student to take the elective from the relevant Dean of the College or School, and the relevant program director and course instructor.)

Content areas that are acceptable for electives include the following: anthropology, biology, creativity, culture and communication, ethics, health psychology, literature, neuroanatomy, neuropsychology, philosophy, psychology, psychoanalysis, sociology, advanced statistics. Additional content areas may be added by special request as approved by the supervising faculty advisor and program director.

PhD in Creative Arts Therapies Admission Requirements

Applicants for the Doctor of Philosophy (PhD) program in Creative Arts Therapies are screened based upon the required application documents plus a personal interview by the faculty. The application documents and interview are designed to assess the applicant's aptitudes and commitment to advanced academic achievement and the development of scholarship. Admission into the PhD program includes both firm and malleable requirements. The firm requirements include a Master's degree in Art, Dance/Movement, Music or Expressive Therapy, a minimum of three years post master's clinical experience, certification in the creative arts therapies field, and at least one research course. We encourage

prospective students to inquire about applying to the PhD program even if they are uncertain that they meet all of the admission requirements. In many cases applicants are considered on a very individual basis and assessment. For this reason we look forward to speaking with applicants regarding eligibility and answering any questions.

Degree Requirements

Master's Degree in Art Therapy, Dance/Movement Therapy, Music Therapy, or Expressive Therapies.

Prerequisites (in addition to or included in Master's degree)

- 6.0 semester (9.0 quarter) credits equivalent in graduate level research coursework.
- 3.0 semester (4.0 quarter) credits equivalent of graduate coursework in multiculturalism, anthropology, or sociology.

Research Education and Training

The PhD in Creative Arts Therapies is a research degree. Consequently it is essential that those entering the program demonstrate foundational education and experience in research.

- Documented research courses with a grade of no less than a 'B'.
- Documentation of having conducted one research project. This can be a master's thesis project or post-master's research.

Scores and GPA

- Graduate Record Examination (GRE) with minimum scores of 300 combined (150 Quantitative and 150 Verbal Reasoning) and 4.0 in analytic writing, or
- Miller Analogies Test (MAT) with scores of 396 or above
- MGPA of 3.5 or above from the master's degree education

Clinical Experience and Credentials

- A minimum of 3 years full-time equivalent post-master's degree creative arts therapies clinical practice.
- Professional credentials including board certification and/or registration in the applicant's Creative Arts Therapies discipline. A professional license is preferred but not required.

Academic Writing Proficiency

Central to success in the PhD program is the ability to write at a professional scholarly level. Even though this ability will develop as a result of being a doctoral student, it is essential that the applicant demonstrate an interest in, commitment to, and aptitude for scholarly writing. Academic Writing Proficiency is evaluated based upon the following criteria and documentation:

- **Academic Writing Sample:** Demonstration of scholarly writing proficiency from an academic writing sample. This could be a graded graduate writing sample or an independently authored publication. Applicants are also invited to generate a new writing sample specifically for this application. All scholarly writing samples should be selected to best represent the applicant's scholarly accomplishments and potential.
- **Publication or manuscript for submission:** Documentation of having submitted an article for a peer reviewed publication. The documentation should be in the form of a manuscript that was submitted to a journal or as a chapter in an edited book. This

manuscript can also be used for the academic writing sample if it was authored solely by the applicant. If it was co-authored, an additional independently authored sample is required to fulfill the requirement for demonstration of scholarly writing proficiency.

- **Admissions Essay:** The admissions essay is an important part of the application and writing proficiency assessment process. Since the PhD is the highest level of scholarly education, the expectation is for incoming students to possess and demonstrate competency in in this area as reflected in their writing. The scholarly writing not only requires writing skill but also represents a thought process—the ability to review, organize, select and synthesize ideas of self and other. In addition, scholarly competence requires familiarity with acceptable writing styles. For those reasons we require an admissions essay which is in three parts:
  - *Reasons for Application:* In this section briefly describe your professional background, your clinical practice and interests and how these experiences coalesced in your decision to apply to the PhD Program (1 page).
  - *Research Interests:* In this section describe 1) two areas of interest for your own research; 2) a summary of current research in these areas; and, 3) the direction you hope to take your research (3 pages).
  - *Academic and Career Goals:* Conclude your essay with a summary of your academic and career goals (1 page).
- **All writing samples should be submitted in APA format.**

Letters of Recommendation

Three letters of recommendation are required as a part of the application process. The letters should be from individuals who can knowledgeably address the applicant's aptitudes for scholarship and teaching. Recommenders should also address the applicant's maturity, initiative, self-directed motivation, and commitment to higher education.

Interview

When the application is completed it will be reviewed by the faculty admissions committee to determine if the applicant meets the admission criteria. Following the initial screening, a determination is made of whether or not the applicant meets the admission criteria. If the determination is made that the applicant does meet the admission criteria, the applicant is scheduled for an interview with the faculty in the PhD program in Creative Arts Therapies. The interview protocol includes:

- Review of application materials and associated questions to address scholarly competencies for the program.
- Discussion regarding the theory and practice of the creative arts therapies and the applicant's specific discipline.
- Discussion of the applicant's research interests, competencies, and ideas.
- Discussion of the applicant's reasons and motivation for applying for doctoral education.

Please contact Ms. Rachel Ward, Admissions Coordinator, for additional information about the admission requirements and the application process at (215) 762-6921 or rsw24@drexel.edu. (gdu23@drexel.edu)

Note: Admissions Schedule

The early priority deadline is January 15th, with rolling admissions through July 1st.

For additional information about how to apply, visit the Drexel Admissions page on PhD in Creative Arts Therapies (http://www.drexel.edu/grad/programs/cnhp/creative-arts-in-therapy).

Creative Arts Therapies Department Faculty

Yasmine Awais, ATR-BC, ATCS, LCAT *(Art Institute of Chicago).* Assistant Clinical Professor. Multicultural art therapy, clinical supervision.

Joke Bradt, PhD, MT-BC *(Temple University).* Associate Professor. Research in music therapy, chronic pain, systematic reviews.

Gayle Gates, MA, BC-DMT *(Immaculate Heart College, CA) Associate Director, Dance/Movement Therapy Programs.* Assistant Clinical Professor. Early childhood development and mother-child interaction, intervention with at risk preschoolers.

Nancy Gerber, PhD, ATR-BC, LPC *(Union Institute and University) Director, PhD Program in Creative Arts Therapies.* Associate Clinical Professor. Art therapy assessment; treatment of adolescents, adults and geriatrics, modern psychoanalysis and art therapy, arts therapy education, doctoral education.

Sharon W. Goodill, PhD, BC-DMT, NCC, LPC *(Union Institute and University) Chair, Department of Creative Arts Therapies.* Clinical Professor. Dance/movement therapy for medically ill patients, mind/body studies, CAT research and leadership.

Florence Ierardi, MM, MT-BC, LPC *(Temple University) Director of Field Education.* Associate Clinical Professor. Effects of percussion playing on the nervous system; rhythm-based assessment models.

Girija Kaimal, EdD, MA *(Harvard University).* Assistant Professor. Art therapy, educational research, program evaluation, art therapy.

Donna H. Kaiser, PhD, ATR-BC, LPC, LMFT *(The College of William and Mary) Director of Art Therapy Programs.* Associate Clinical Professor. Art therapy research, art therapy with clients with substance abuse diagnoses; development of an art therapy assessment for evaluating attachment security.

Paul Nolan, MCAT, MT-BC, LPC *(Hahnemann Medical College) Director of Music Therapy Programs.* Associate Clinical Professor. Music and child development, outcome studies in music therapy; analysis of musical behaviors in music therapy; psychological responses to music therapy.

Ellen Schelly-Hill, MMT, BA *(Antioch NE Graduate School) Director of Dance/Movement Therapy Programs.* Associate Clinical Professor. Adults diagnosed with mood disorders, anxiety, and chronic pain; creative arts in therapy for at-risk adolescents.

PhD in Nursing

Major: Nursing
Degree Awarded: Doctor of Philosophy
Calendar Type: Quarter
Total Credit Hours: 49.0
Classification of Instructional Programs (CIP) code: 51.3801
Standard Occupational Classification (SOC) code: 29-1141

About the Program

The College of Nursing and Health Professions (CNHP) offers a Doctor of Philosophy in Nursing Science, a research-based program, which aims to

prepare nurse researchers to design, conduct and lead research studies as emerging nurse scientists. The objective of the PhD in Nursing is to prepare professional nurses as scholars and researchers who will make a substantive contribution to the body of knowledge for the discipline of nursing and thereby improve health services for those who receive nursing care. Graduates are expected to plan and launch an independent program of research, seek needed support for initial phases of the research program, and begin to involve others (i.e., students, clinicians, and other researchers) in their activities.

The program of study builds on advanced preparation in nursing at the master's level (MSN to PhD). In addition to structured coursework, the program builds upon a research mentorship model which recognizes that research skills are learned most effectively by working with a faculty mentor, who provides opportunities to use the tools to conduct research and design, and execute an original research within a focused program of study.

Innovation, leadership, and interdisciplinary collaboration are strong educational values which are reflected in the Drexel University emerging strategic plan. The PhD in nursing program represents leadership in the fields, with interdisciplinary collaboration as core administrative and curricular values basic to its philosophy and epistemology. Innovation is also central to this doctoral program as evidenced in its curriculum and research philosophy.

The College of Nursing and Health Professions (CNHP), Graduate Nursing Division in which the Doctoral Nursing Program is housed, is regarded as a forward thinking, progressive, and interdisciplinary healthcare school within the university as well as in the larger context of advanced healthcare education.

Admission Requirements

Applicants must possess a master's degree in nursing for admission consideration. Criteria for admission include:

- GPA of 3.5
- GRE scores
- OREs (and TOEFLs, if international)
- Letters of recommendation (3)
- Articulation of research interests, career goals and insight into important issues in the profession in essays
- Professional accomplishments
- Fit with faculty research interests and expertise

Degree Requirements

The PhD curriculum requires 49.0 quarter credits of course work plus comprehensive examination and dissertation completion. Of the 49.0 credits, 15.0 credits are required interdisciplinary courses, and 21.0 credits in nursing science. In addition, there are three elective courses that form the student's field of concentration related to their dissertation research. These elective courses can be taken anywhere within the university but must be approved by the student's advisor and the Doctoral Curriculum Committee in advance of taking these courses. The student files a plan of Study outlining these courses in the winter of the first year which is approved by the Curriculum Committee.

Required Courses

NURS 800	Theoretical Foundations of Nursing Inquiry 1	3.0
NURS 819	Qualitative Methods in Clinical Nursing	3.0
RSCH 759	Foundations of Biostatistics	3.0
NURS 801	Theoretical Foundations of Nursing Inquiry II	3.0
RSCH 811	Intermediate Biostatistics	3.0
RSCH 770	Foundations in Research Methods	3.0
NURS 806	Scientific Appraisal and Knowledge Development	3.0
RSCH 812	Interpretation of Data	3.0
NURS 803	Doctoral Seminar: Scientific Integrity	1.0
RSCH 813	Measurement Theory in Healthcare	3.0
NURS 804	Doctoral Seminar: Creating Intellectual Community	1.0
Required Research Apprenticeship (total of 3 credits)		3.0
NURS 850	Research Apprenticeship (Must be repeated 2 times)	
NURS 820	The Science of Therapeutics	3.0
NURS 805	Doctoral Seminar: Grantsmanship	1.0
Dissertation Research (minimum of 4 credits)		4.0
NURS 989	Dissertation (May be repeated up to 7 times)	
Electives		9.0
NURS 860	Integration of Genetics/Genomics in a Research Agenda	
NURS 861	Interdisciplinary Approaches in Aging Research	
NURS 862	Reproductive Epidemiology	
NURS 863	Mixed-Methods Research	
NURS 899	Independent Study	
Total Credits		**49.0**

Nursing Faculty

Lisa B. Aiello-Laws, RN, MSN, AOCNS, APN-C *(University of Pennsylvania)*. Assistant Clinical Professor. Adult oncology and cancer genetics.

Scott D. Alcott, MSN *(Drexel University)*. Assistant Clinical Professor. Nursing informatics, leadership, technology, and on-line learning.

Kristen Altdoerffer, MSN, CRNP, BSN, RN *(Drexel University)*. Assistant Clinical Professor. Pediatric and adolescent nursing.

Barbara Amendolia, DrNP, NNP, APN-BC *(Drexel University)*. Assistant Clinical Professor. Neonatology, specifically feeding difficulties and respiratory diseases of the newborn.

Katherine Kaby Anselmi, PhD, JD, CRNP *(University of Pennsylvania) Assistant Dean of Accreditation/Regulatory Affairs & Online Innovation* . Associate Clinical Professor. Nursing, law, family nurse practitioner, women's health nurse practitioner.

Lew Bennett, CRNA, MSN *(Temple University) Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

Suzan Blacher, MSN, CARN, CCIT *(Drexel University) RN-BSN Program*. Assistant Clinical Professor.

Joan Rosen Bloch, PhD, CRNP *(University of Pennsylvania)*. Associate Professor. Maternal and infant health outcomes with a particular focus on racial and ethnic perinatal health disparities.

Susan M. Burke, PhD, RN, CPNP-BC *(The Catholic University of America)*. Associate Clinical Professor. Pediatric primary care, health

disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Barbara Celia, MSN, EdD *(University of Pennsylvania; Rutgers University)*. Assistant Clinical Professor. Pain management and access to health care.

Paul Thomas Clements, RN *(University of Pennsylvania)*. Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC *(The University of Pennsylvania)*. Assistant Clinical Professor. Critical care nurse practitioner.

Ferne Cohen, CRNA, EdD *(Drexel University) Associate Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

John T. Cornele, MSN, RN, CNE, EMT-P *(Drexel University) Director CICSP*. Instructor. Airway management, nursing and paramedic educational issues, PDA implementation topics, simulation development, use of standardized patients and the art and science of moulage.

Frances H. Cornelius, PhD, MSN *(Drexel University; Wayne State University) Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Linda Dayer-Berenson, PhD, MSN, CRNP, CNE, FAANP *(Rutgers University - formally UMDNJ-SHRP)*. Associate Clinical Professor. Adult health, pharmacology, cultural competence and pain management.

Diane DePew, DSN, RN *(University of Alabama, Birmingham)*. Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN *(University of Pennsylvania)*. Associate Clinical Professor. Nursing education and rehabilitation nursing.

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC *(New York University, School of Education, Division of Nursing)*. Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Gloria Donnelly, PhD *(Bryn Mawr College) Dean of the College of Nursing & Health Professions*. Professor. Nursing education and a variety of mental health topics including assertiveness, stress and change.

Jane Donovan, MSN, RNC *(Villanova University)*. Assistant Clinical Professor. Women's health

H. Michael Dreher, PhD, RN, FAAN *(Widener University)*. Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Brian Fasolka, MSN, RN, CEN *(DeSales University)*. Assistant Clinical Professor. Emergency nursing, adult health nursing, and nursing education.

Theresa Fay-Hillier, RN, MSN *(University of Pennsylvania)*. Assistant Clinical Professor. Child, adolescent and family mental health nursing.

Kathleen Fisher, PhD, CRNP *(Pennsylvania State University)*. Associate Clinical Professor. Health care for vulnerable populations, decision making in vulnerable populations (i.e. individuals with intellectual disability.)

Alecia Schneider Fox, PhD (Candidate) *(Widener University) Senior Director Nursing Faculty Affairs and Clinical Education*. Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

Sandra A. Friedman, MSN, CNM *(Yale University)*. Assistant Clinical Professor. Interdisciplinary team simulation and debriefing, health assessment and health promotion, nurse midwifery with specialty in adolescent health, nurse managed health center administration.

Mary Gallagher-Gordon, PhD, MSN, RN, CNE *(Drexel University) Senior Director of Contracts, Compliance and Academic Community Initiatives*. Assistant Clinical Professor. Informatics, patient safety and nursing education, NCLEX review.

Ellen Giarelli, EdD, CRNP *(University of Pennsylvania; Rutgers University) Director of Post-baccalaureate Certificate Program in the Integrated Nusing Care of Autism Spectrum Disorder*. Associate Professor. Genetic/genomic nursing care, self-management of chronic disorders, autism spectrum disorder.

Karen Goldschmidt, MSN, RNC *(Wilmington University) Department Chair, RN-BSN Completion Department* . Assistant Clinical Professor. Professional issues, nursing education, staff development, scholarly writing.

Maureen Gonzales, MSN, CRNP *(University of Pennsylvania) Public Health Nurse*. Assistant Clinical Professor. Women's health.

Elizabeth Gonzalez, PhD, PMHCNS-BC *(New York University) Department Chair, Doctoral Nursing Program* . Associate Clinical Professor. Chronic stress, geropsychiatry, depression among the elderly, minority health issues and cross-cultural research among family caregivers of relatives with Alzheimer`s disease.

Mary K. Green, MSN, RN, BC *(Drexel University)*. Assistant Clinical Professor. Community public health nursing, maternal child health nursing.

Donna Gribbin, RN, DNP, CNE *(Duquesne University)*. Assistant Clinical Professor. Medical-surgical nursing, simulation, nursing education.

Cynthia Hambach, MSN, RN, CCRN *(Widener University)*. Assistant Clinical Professor. Critical care nursing.

Elizabeth Hammond-Ritschard, RN, MSN *(Cedar Crest College)*. Assistant Clinical Professor. Adult health nursing, nursing education.

Thomas L. Hardie, EdD, RN, PMHCNS-BC *(Columbia University, Teachers College)*. Associate Professor. Psychiatric nursing, cancer survivorship, treatment research outcomes in substance abuse

Margaret M. Harkins, DNP, MBE, MSN, GNP-BC *(Chatham University)*. Assistant Clinical Professor. Gerontology, hospice/palliative care, clinical bioethics.

Angela C. Hawes, MSN, RN *(University of Pennsylvania)*. Assistant Clinical Professor. Child and family health nursing.

Karyn Holt, PhD, RN, CNM *(Georgetown University; Touro University) Director of Online Quality, CNHP, Division of Nursing* . Associate Clinical Professor.

Lisa Johnson, DrNP, CRNP, ACNP *(Drexel University).* Assistant Clinical Professor. Surrogate end-of-life decision making within minority populations in the acute care setting; ethnonurishing.

Dana C. Kemery, RN, MSN *(Drexel Universiy).* Assistant Clinical Professor. Emergency nursing (adult and pediatric), nursing education.

Michelle Kensey, MSN, RN *(University of Pennsylvania) Chair of Undergraduate Women's Health, Perinatal Clinical Nurse Specialist.* Assistant Clinical Professor.

Priscilla Killian, MSN, RNC, MHPNP *(LaSalle University).* Assistant Clinical Professor. Global and public health, health promotion, disease prevention in a community setting and the integration of psychiatric and primary care services to the persistently mentally ill living in the community setting.

Cindy M. Little, PhD, WHNP, CNS *(Virginia Commonwealth University in Richmond, VA).* Assistant Clinical Professor. Women's health, obstetrics and clinical genetics.

Jean S. MacFadyen, PhD, RN *(University of Pennsylvania).* Assistant Clinical Professor. Intra-Entrepreneurship in advance practice nursing, gerontology, leadership, transcultural nursing.

Mary Kay Maley, RN, MSN, APN *(University of Medicine and Dentistry of New Jersey).* Assistant Clinical Professor. Family health, faith community nursing, health promotion/disease prevention and mindfulness-based stress reduction.

Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP *(Drexel University).* Assistant Clinical Professor. Nursing, women's health, family practice.

Pamela McGee, MSN, FNP-BC, CNE *(University of Pennsylvania).* Assistant Clinical Professor. Medical/surgical nursing, gerontology, primary care, family nurse practitioner.

Marylou K. McHugh, RN, EdD *(Teachers College; Columbia University).* Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC *(University of Pennsylvania).* Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP *(University of Pennsylvania).* Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Faye (Pearlman) Meloy, PhD, MSN, MBA *(Drexel University) Associate Dean, Prelicensure BSN Programs.* Associate Clinical Professor. Clinical practice; education; health policy and planning; community service; human resources and health care administration.

Sally K. Miller, PhD, CRNP *(Walden University).* Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

Kymberlee Montgomery, DrNP, CRNP *(Drexel University) Chair, NP Programs.* Assistant Clinical Professor. Medicine, women's health nurse practitioner, education, interprofessional education.

Dana Murphy-Parker, MS, CRNP, PMHNP-BC *(University of Colorado) Track Director, Psychiatric Nurse Practitioner Program.* Assistant Clinical Professor.

Louise G. Murray, MSN, CRNP, FNP-BC *(Drexel University).* Assistant Clinical Professor. Family nurse practitioner.

Maura A. Nitka, MSN, RN, CPN, APN *(Drexel University).* Assistant Clinical Professor. Pediatric nursing.

Carol Okupniak, MSN, RN *(Thomas Jefferson University).* Assistant Clinical Professor. Nursing women's health, nursing leadership, informatics.

Jennifer Olszewski, MSN CRNP *(LaSalle University) Director of the Adult-Gerontology Primary Nurse Practitioner Program.* Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN *(Drexel University).* Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE *(University of Pittsburgh School of Public Health)).* Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span, primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNAA-BC *(University of Pennsylvania).* Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC *(University of Pennsylvania).* Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN *(University of Pennsylvania).* Associate Clinical Professor. Nursing intervention/outcome studies and nursing treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Brenda Reap-Thompson, MSN, RN *(Villanova University).* Assistant Clinical Professor. Adult health/nursing eduction; safety and legal issues in nursing and test development.

Mary Jean Ricci, MSN, RN, BC *(University of Pennsylvania) Adjunct Faculty Coordinator.* Assistant Clinical Professor. Community public health, medical-surgical nursing.

Patricia A. Riccio, PhD, RN *(University of California, Los Angeles).* Assistant Clinical Professor. Research methods and biostatistics.

Leland Rockstraw, PhD, RN *(Drexel University) Assistant Dean, Clinical Simulation and Practice.* Associate Clinical Professor. Adult orthopedic/surgical, emergency care, critical care, and trauma/surgery intensive care.

Al Rundio, Jr., PhD, DNP, RN, APRN, NEA, BC *(University of Pennsylvania) Interim Associate Dean for Advanced Practice Nursing Programs, Chair of DNP Program.* Clinical Professor. Nursing graduate leadership and management track.

Jo Ann Runewicz, EdD, RN, C, MSN *(Nova SE University).* Assistant Clinical Professor. Gerontology, adult health and education.

Jane Greene Ryan, PhD *(Widener University)*. Assistant Clinical Professor. Nursing women's health.

Donna Sabella, PhD, MEd, MSN, PMHNP-BC *(University of Pennsylvania) Director of Global Studies*. Assistant Clinical Professor. Cultural competence, human trafficking, mental health, forensic nursing, working with vulnerable populations.

Deanna Lynn Schaffer, MSN, RN, CNE, ACNS-BC *(MCP Hahnemann University) Chair of the BSN Co-Op Program*. Assistant Clinical Professor.

Joanne Schwartz, PhD, CRNP, CNE *(Villanova University) Chair of the Accelerated BSN Department.* Assistant Clinical Professor.

Joanne Serembus, EdD, RN, CCRN (Alum), CNE *(Widener University)*. Associate Clinical Professor. Critical care nursing, adult health nursing, nursing education, curriculum development and patient safety.

Susan Solecki, MSN *(Hahnemann University)*. Assistant Clinical Professor. Nursing women's health, adult health, and occupational health.

Ann Thiel-Barrett, DNP, RN, FNP-BC, CNE *(Chatham University)*. Assistant Clinical Professor. Family health nursing.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC *(Chatham University)*. Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

Donna Trinkaus, MSN, RN *(DeSales University)*. Assistant Clinical Professor. Critical care nursing, adult health nursing, infection control and nursing education

AtNena Tucker, DNP, FNP-BC *(University of South Alabama)*. Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

Jeannine Uribe, PhD, RN *(University of Pennsylvania) Community Clinical Coordinator*. Assistant Clinical Professor. Public health nursing; international, professional collaboration, philanthropic health care projects, urban public health issues and caring for immigrant populations.

Roberta Waite, EdD, MSN *(Widener University; University of Pennsylvania) Assistant Dean of Academic Integration and Evaluation of Community Programs.* Associate Professor. Psychiatric nursing; depression and ADHD in minority adults, and the effects of adverse childhood experiences on adult health in minority adults.

Louise Ward, PhD, CRNP, CNE *(Binghamton University)*. Associate Clinical Professor. Public health nursing.

Lori Wheeler, MSN, RN *(West Chester University)*. Assistant Clinical Professor. Adult health nursing, community health nursing, and nursing education.

Regina Willard, MSN, RN *(Drexel University)*. Assistant Clinical Professor. Nursing, cardiology, acute care nurse practitioner.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE *(Rutgers University) Assistant Dean for Special Projects, Simulation & CNE Accreditation.* Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Virginia Wilson, RN, MSN, NEA-BC, NE-BC *(Widener University)*. Assistant Clinical Professor. Leadership and management.

Regina Wright, MSN, CEN *(University of Pennsylvania)*. Assistant Clinical Professor. Care of the adult patient with complex health problems (medical/surgical concentration); professional role development; approaches to adult learning behaviors.

Mary Ann Zimmer, MSN, CPN *(Villanova University)*. Assistant Clinical Professor. Pediatrics, adult medical-surgical nursing, nursing education.

Janet Zimmerman, MSN, BSN *(University of Colorado)*. Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN *(Widener University)*. Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

Nutrition Sciences

Major: Nutrition Sciences
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 30.1901
Standard Occupational Classification (SOC) code: 11-9121; 29-1031

About the Program

The program mission is to develop scientists who are able to contribute to the scholarly generation of nutrition science knowledge, spanning the overlapping disciplines of human nutrition, nutritional biochemistry, food safety, human physiology, exercise physiology and community nutrition; and the translation of this knowledge with respect to health, disease prevention and treatment.

Nutrition scientists who have a PhD can be involved in research, education, industry, community health, and/or clinical practice. With the current epidemic of obesity and type 2 diabetes mellitus, the need for PhD-educated nutritionists who can discover and design new treatment interventions is of major public health interest.

Admission Requirements

Applicants must possess a minimum of a Bachelor's of Science degree in biology, chemistry, nutrition, exercise physiology, food science or a similar area with a strong science base, and have taken an advanced undergraduate course in biochemistry, as well as a course in human nutrition and a course in basic statistics.

- College/University transcripts with a minimal overall grade point average (GPA) of 3.0 (on a 4.0 scale)
- Graduate Record Exam (GRE): minimum combined score of 308 on the Verbal and Math sections
- Two letters of recommendation from advisors, supervisors, professors, and/or mentors
- Curriculum vitae
- Personal statement outlining career plan, topic of research interest and preferred Nutrition Sciences faculty mentor which whom he/she would like to work

Degree Requirements

The PhD program consists of 90.0 quarter credits. The 90 credits include 45.0 credits of course work, 45.0 credits of research, as well as a research dissertation. Additionally, all PhD students will be required to

obtain a minimum of 10 contact hours of classroom teaching experience in nutrition science courses.

Required Nutrition Courses (18 credits):

NFS 525	Nutritional Assessment Through the Life Cycle	3.0
NFS 601	Research Methods	3.0
NFS 801	Techniques in Nutrition Sciences Research	3.0
NFS 810	Integrative Nutrition I	3.0
NFS 811	Integrative Nutrition II	3.0
NFS 812	Integrative Nutrition Practicum	3.0
Required Statistics Courses (6 credits):		
RSCH 811	Intermediate Biostatistics	3.0
RSCH 812	Interpretation of Data	3.0
Required Professional Skills Courses (9 credits):		
RSCH 813	Measurement Theory in Healthcare	3.0
RSCH 770	Foundations in Research Methods	3.0
RHAB 815	Scientific Inquiry and Writing	3.0
Electives:		
12 credits chosen from graduate nutrition, basic science or other courses, as determined by the faculty mentor and/or dissertation committee		12.0
Independent Research (33 credits):		33.0
NFS 997	Research	
Dissertation Research (12 credits):		12.0
NFS 999	Dissertation Research	
Total Credits		**90.0**

Nutrition Sciences Faculty

Nyree Dardarian, MS, RD, LDN *(Drexel University) Nutrition and Foods. Director, Center for Integrated Nutrition & Performance; Coordinator, Individualized Supervised Practice Pathway.* Instructor. Energy expenditure.

Angelo Del Parigi, MD *(University of Bari, Italy) Courtesy Appointment.* Visiting Research Professor.

Beth L. Leonberg, MS, MA, RD *(Colorado State University, Rowan University) Director, Didactic Program in Dietetics .* Instructor. Pediatric nutrition.

Brandy-Joe Milliron, PhD *(Arizona State University).* Assistant Professor. The development and evaluation of modifications in the natural environment to promote healthier living; farm to table school initiatives;

Donna H. Mueller, PhD *(Temple University) Registered Dietitian, Nutrition and Foods.* Associate Professor. Clinical nutrition; pediatric nutrition; nutrition in pulmonary diseases, especially cystic fibrosis; nutrition in developmental delay; dental nutrition; dietetic education and professional development.

Juan Muniz, PhD *(Oregon State University) Laboratory Manager.* Assistant Research Professor. Food microbiology; community-based research to assess pesticide levels in homes; prevention of health effects of pesticides for indigenous farmworkers.

Jennifer Nasser, PhD *(Rutgers University).* Associate Professor. Dopamine-mediated mechanisms of food intake regulation in humans and

its impact on metabolic homeostasis, especially as it applies to obesity, eating disorders and aging.

Jennifer Quinlan, PhD *(North Carolina State University).* Associate Professor. Food microbiology; microbiological quality and safety of produce, dairy and meat products in markets in high vs. low socioeconomics areas, Bacillus and Clostridium spores in food processing.

Barry Ritz, PhD *(Drexel University) Courtesy Appointment.* Visiting Research Professor.

Vicki Schwartz, MS *(Drexel University) Nutrition and Foods.* Assistant Clinical Professor. Advanced nutrition, clinical nutrition, nutrition support.

Alison Ventura, PhD *(Pennsylvania State University).* Assistant Professor. Factors that contribute to the development of eating behaviors and dietary preferences during infancy and early childhood.

Stella Lucia Volpe, PhD, RD, LDN, FACSM *(Virginia Polytechnic Institute and State University) Chair, Nutrition Sciences.* Professor. Prevention of obesity and diabetes across the lifespan; mineral metabolism and exercise; energy balance; sports nutrition.

Interdepartmental Faculty

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC *(New York University, School of Education, Division of Nursing).* Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Michael Lowe, PhD *(Boston College).* Professor. Prevention and treatment of eating disorders and obesity; effects of appetitive responsiveness and dietary restraint on eating regulation; psychobiology of obesity-proneness; empirical foundations of unconscious processes.

Margaret O'Neil, PT, PhD, MPH *(MCP Hahnemann University; Duke University; University of North Carolina at Chapel Hill).* Associate Professor. Measurement of and interventions to improve physical activity and fitness levels and promote participation in children and youth with who are overweight/obese and those with physical disabilities (especially cerebral palsy).

Patricia A. Shewokis, PhD *(University of Georgia).* Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalography (EEG) and methodology and research design.

Physician Assistant Post-Professional Master's Program

Major: Physician Assistant, Post-Professional
Degree Awarded: Master of Health Sciences (MHS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 51.0912
Standard Occupational Classification (SOC) code: 29-1071

About the Program

The Master of Health Science (MHS) degree is awarded by the University through the College of Nursing and Health Professions' Physician Assistant Post-Professional Master's program. This program builds upon

knowledge and skills learned in the PA professional training programs in areas of health policy, evidence-based practice, and leadership. The program is available totally online, and it may be completed on a part-time basis.

The Physician Assistant Post-Professional Master's program provides graduate education courses as a basis for personalized, professional development within the student's selected area of study. The goal of the program is to enhance basic physician assistant skills and to mentor students in areas of study beyond what is offered by entry-level physician assistant programs. The individually selected study concentration is augmented by the expertise of seasoned faculty and the vast resources of the University.

Specifically, the Physician Assistant Post-Professional Master's program seeks to:

- Broaden the base and depth of analytical thinking by providing a foundation for scholarly inquiry
- Mentor physician assistants in personalized, professional development to enhance the PA profession, its members, and the communities they serve

Additional Information

For more information about this program, contact the the Business Manager:

Denise Mielechowski
PA Post-Professional Master's Program
College of Nursing and Health Professions
dmm58@drexel.edu

For more details, visit Drexel's College of Nursing and Health Professions Physician Assistant Post-Professional Master's (https://www.drexel.edu/cnhp/academics/graduate/MHS-Physician-Assistant-Post-Professional-Masters-Program) web page.

Degree Requirements

All students in this program complete a total of 45.0 quarter credits for graduation. The program requires completion of 5 core courses (25.0 quarter credits). The cognate courses, 15.0 quarter credits, are courses in a student's area of interest, and 5.0 quarter credits for the capstone experience that deepens a student's understanding of chosen areas.

For the exceptional graduate student with significant professional credentials achieved as a physician assistant, preparation and presentation of the professional portfolio to a university-based multidisciplinary committee may substitute for all or portions of the credits required for the two graduate project courses.

Required Core Courses

PA 581	Research Methods and Designs	5.0
PA 582	Principles of Evidence-Based Practice	5.0
PA 583	Clinical Application of Epidemiology	5.0
PA 584	Health Policy	5.0
PA 585	Leadership and Stewardship	5.0
Study Concentration Courses		
Cognate 1 *		5.0
Cognate 2 *		5.0
Cognate 3 *		5.0

PA 698	Capstone Project	5.0
Total Credits		**45.0**

* Students may select Cognate courses related to their areas of interest from one of the Study Tracks (http://www.drexel.edu/catalog/masters/adv-pa.htm#Studytracks) listed below.

Study Tracks

Clinical Practice

PA 641	Clinical Update	5.0
PA 642	Clinical Colloquium	5.0
or PA 640	Clinical Practicum	
PA 643	Clinical Practice Project Research	5.0
PA 698	Capstone Project	5.0

Health Promotion

PA 661	Tenets of Health Promotion	5.0
PA 662	Health Promotion Materials	5.0
PA 663	Health Promotion Project Research	5.0
PA 698	Capstone Project	5.0

Drexel e-Learning Certificate Options

Complementary and Integrative Therapies Certificate		12.0
PA 697	Independent Study	3.0
PA 698	Capstone Project	5.0
Leadership in Health Systems Management Certificate		12.0
PA 697	Independent Study	3.0
PA 698	Capstone Project	5.0
Heathcare Informatics Certificate		9.0
PA 697	Independent Study	6.0
PA 698	Capstone Project	5.0
Epidemiology and Biostatistics Certificate		12.0
PA 697	Independent Study	3.0
PA 698	Capstone Project	5.0
Toxicology and Industrial Hygiene Certificate		12.0
PA 697	Independent Study	3.0
PA 698	Capstone Project	5.0
Certificate of Study in Clinical Research *		15.0

* PA 698 Capstone Project will be fulfilled with the completion of either CR 600S Designing the Clinical Trial or CR 609S Innovative Product Development.

Alternate Pathway

Cognate 1		5.0
Cognate 2		5.0
PA 695	Portfolio Preparation	1.0
PA 696	Portfolio Review	5.0-10.0
Total Credits		**16.0-21.0**

Physician Assistant Faculty

Patrick C. Auth, PhD, PA-C *(Drexel University) Department Chair, Physician Assistant Department.* Clinical Professor. Clinical reasoning of physician assistant students.

Adrian Banning, MMS, PA-C *(Arcadia University).* Assistant Clinical Professor. Dermatology, family practice, and evidence based medicine.

Geraldine A. Buck, DrPH, MHS, PA-C *(Drexel University) Director, Physician Assistant Post-Professional Master's Program.* Associate Teaching Professor. Public health.

M. Rebecca Buckley, MHS, PA-C *(Drexel University) Associate Director of Clinical Education.* Assistant Clinical Professor. Psychiatry.

Rosalie Coppola, MHS, PA-C *(Drexel University).* Associate Clinical Professor. Standardized patients, simulation, clinical assessment and pharmacology.

G. John DiGregorio, MD, PhD *(Hahnemann University) Medical Director of the Hahnemann Physician Assistant Program.* Professor. Pharmacology.

Ellen D. Feld, MD, FACP *(University of Cincinnati, College of Medicine).* Associate Clinical Professor. Clinical medicine and ethical issues.

Gretchen L. Fox, MMSc, PA-C *(St. Francis College) Associate Program Director.* Associate Clinical Professor. Internal medicine/family practice.

Juanita Gardner, MPH, PA-C *(Drexel University).* Assistant Clinical Professor. Primary care and global health.

Julie Kinzel, MEd, PA-C *(Temple University).* Assistant Clinical Professor. Long term care experiences, geriatrics, gastroenterology and liver disease.

Daniela C. Livingston, PA-C, MD *(Medical School, Bucharest, Romania; University of Washington, Seattle).* Assistant Clinical Professor. Pediatrics, primary care and working with underserved populations, with a special emphasis on preventative pediatrics.

Ann McDonough Madden, MHS, BS, PA-C *(Drexel University).* Clinical Instructor. Healthcare disparities, urban health.

Nina Multak, MPAS, PA-C *(University of Nebraska).* Associate Clinical Professor. Human patient simulators, standardized patients and healthcare informatics.

Diana D. Smith, MHS, PA-C *(Drexel University).* Clinical Instructor. Primary care and international health care; distance education.

Charles Stream, MPH, PA-C *(George Washington University).* Assistant Clinical Professor. Clinical assessment and skills.

Post-Baccalaureate Certificate in Integrated Nursing Care of Autism Spectrum Disorder (ASD)

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post Baccalaureate
Number of Credits to Completion: 9.0 - 12.0
Instructional Delivery: Online

Calendar Type: Quarter
Expected Time to Completion: 1 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3801
Standard Occupational Classification (SOC) Code: 29-1141

Autism spectrum disorder (ASD) is a condition that has significant health implications for affected people across the lifespan, and for family members.

This certificate program focuses specifically on the *integrated care* of the complex health problems of people affected by autism spectrum disorder, as well as the collaborations among patients, families, and healthcare providers. The program prepares students to pursue a highly innovative role in an area of practice in which the value of nursing care needs to be developed. Graduates of the certificate program will reshape how care is provided to people with ASD, across the lifespan.

This post-baccalaureate certificate is designed for nurses already working in fields such as pediatrics, family practice, mental health, and school nursing. Students in master's programs may pursue this certificate to achieve a specialization in autism spectrum disorder nursing care. Students in the master's programs may also take courses to fulfill elective requirements.

Goals and Objectives

- To provide nurses with information on the nursing care of people with autism spectrum disorders, across the lifespan.
- To examine the prevalence, etiology, and clinical characteristics of autism spectrum disorder in the context of the family and team approach to care.
- To integrate scientific and evidence based knowledge of autism spectrum disorder with the clinical skills of the registered nurse working with this population.
- To integrate scientific and evidence based knowledge of autism spectrum disorder with the clinical skills of the registered nurse who specialized in the adult population.
- To formulate a practice philosophy and long term professional agenda in ASD care to include practice, education, and research.

Curriculum

Required course work for the Certificate in Integrated Nursing Care of Autism Spectrum Disorder is dependent upon the desired focus of study. A focus on:

- Pediatric Healthcare requires three courses: ASD I, ASD II and ASD IV: NURS 540, NURS 541 and NURS 543;
- Adult Healthcare requires three courses: ASD I, ASD III and ASD IV: NURS 540, NURS 542 and NURS 543;
- Healthcare Across the Lifespan requires all four courses: NURS 540, NURS 541, NURS 542, and NURS 543.

Requirements

Students select either 3 or 4 of the following, depending on area of focus:		9.0-12.0
NURS 540	ASD I: Introduction to Autism Spectrum Disorder	
NURS 541	ASD II: Health and Behavioral Care Planning and Intervention for Children and Adolescents	
NURS 542	ASD III: Health and Behavioral Care Planning and Intervention for Adults with ASD	

NURS 543	ASD IV: Nursing Leadership and Advocacy for ASD	
Total Credits		**9.0-12.0**

Additional Information

For more information about this program, contact:

Mr. Redian Furxhiu
Student Services Manager
rf53@drexel.edu
267.359.5691

Additional information is also available on Drexel's College of Nursing and Health Professions Integrated Nursing Care of Autism Spectrum Disorder (http://drexel.edu/cnhp/academics/post-baccalaureate/Certificate-PB-Integrated-Nursing-Care-of-Autism-Spectrum-Disorder) web page and on Drexel University Online's Integrated Nursing Care of Autism Spectrum Disorder (http://www.drexel.com/online-degrees/nursing-degrees/cert-nasd) web page.

Post-Master's Certificate in Art Therapy

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 57.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.2301
Standard Occupational Classification (SOC) Code: 29-1129

About the Program

The post-master's degree in art therapy is for those individuals who hold a master's degree in a related mental health field such as counseling, social work, psychology, dance/movement therapy, music therapy, psychiatric nursing, or couples and family therapy. It consists of 57.0 quarter credits of art therapy course work and 1200 hours of supervised clinical art therapy practice and internship. Completion of the post-master's degree program in art therapy and fulfillment of post-graduation supervised clinical hours will allow the individual to be eligible for registration and certification as an art therapist by the Art Therapy Credentials Board.

Admission Requirements

Candidates for the post-professional master's degree program in art therapy must meet the following admission requirements:

- Documentation of a 48.0 semester credit or 72.0 quarter credit master's degree completed from an accredited institution in the United States (or equivalent degree from an international institution) in a related field such as counseling, psychology, social work, dance/movement therapy, music therapy, psychiatric nursing and couples and family therapy.
- A 3.0 or above GPA in their graduate school studies as reflected in the submission of official transcript(s).
- An autobiography/personal statement, as described in the application materials.
- Documentation on the transcript of completion of coursework in the following content areas during their related master's degree

education: (a) psychopathology; (b) human growth and development; (c) counseling and psychological theories; (d) cultural and social diversity; (e) assessment; and (f) research.

- Documentation of the completion of 18.0 semester or 27.0 quarter credits in studio art. The studio art courses should reflect experience and facility with multiple art media such as drawing, painting, clay, sculpture, photography, etc. The credits must be completed either prior to admission, which is preferable, or within 12 months of enrollment.
- Applicant interview with the faculty of the graduate art therapy program.
- Review of applicant's art portfolio prior to the interview. The portfolio should include art work reflecting proficiency with a range of two- and three-dimensional art media.
- Candidates with a graduate degree from a non-U.S. institution must submit their graduate academic records for evaluation by an agency such as World Education Service (WES). The Test of English as a Foreign Language (TOEFL) is required if English is a second language (minimum expected score: 600 paper/250 computer). International candidates should request instructions about all of these requirements with their admission materials and are advised to begin the admission process early.

Curriculum and Sample Plan of Study

First Year Courses

ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 503	Introduction to Creative Arts Therapy III	2.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 511	Clinical Practicum II	1.0
ARTS 511	Clinical Practicum II	1.0
ARTS 512	Clinical Practicum III	1.0
ARTS 531	Art Therapy Assessment and Treatment for Adults I	2.0
ARTS 532	Art Therapy Assessment and Treatment for Adults II	2.0
ARTS 533	Art Therapy Assessment and Treatment for Children I	2.0
ARTS 534	Art Therapy Assessment and Treatment for Children II	2.0
ARTS 535	Art Therapy Theory and Symbolism I	2.0
ARTS 536	Art Therapy Theory and Symbolism II	2.0
ARTS 537	Art Therapy Group Supervision I	2.0
ARTS 538	Art Therapy Group Supervision II	2.0
ARTS 539	Art Therapy Group Supervision III	2.0
ARTS 540	Art Therapy Literature and Research	2.0
ARTS 541	Jungian Psychology for Art Therapists	2.0
ARTS 542	Group Dynamics: Art Therapy	2.0
Second Year Courses		
ARTS 610	Clinical Internship I	3.0
ARTS 611	Clinical Internship II	3.0
ARTS 612	Clinical Internship III	3.0
ARTS 631	Processes and Materials in Art Therapy & Counseling	2.0
ARTS 632	Advanced Art Therapy Process and Practice I	2.0
ARTS 633	Advanced Art Therapy Process and Practice II	2.0

ARTS 634	Art Therapy Family Assessment	2.0
ARTS 636	Studio Art for Art Therapists	0.5
ARTS 637	Advanced Art Therapy and Counseling Group Supervision I	1.5
ARTS 638	Advanced Art Therapy and Counseling Group Supervision II	1.5
ARTS 639	Advanced Art Therapy and Counseling Group Supervision III	1.5
Choose 1 elective course:		1.0
ARTS 640	Medical Art Therapy	
ARTS 641	Forensic Art Therapy	
ARTS 642	Art Therapy in an Education Setting	
ARTS 643	Trauma and Art Therapy	
Total Credits		**57.0**

First Year

Fall		Credits
ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 506	Professional Orientation and Ethics I	1.0
ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 531	Art Therapy Assessment and Treatment for Adults I	2.0
ARTS 533	Art Therapy Assessment and Treatment for Children I	2.0
ARTS 535	Art Therapy Theory and Symbolism I	2.0
ARTS 537	Art Therapy Group Supervision I	2.0
	Term Credits	**12.0**
Winter		
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 511	Clinical Practicum II	1.0
ARTS 532	Art Therapy Assessment and Treatment for Adults II	2.0
ARTS 534	Art Therapy Assessment and Treatment for Children II	2.0
ARTS 536	Art Therapy Theory and Symbolism II	2.0
ARTS 538	Art Therapy Group Supervision II	2.0
	Term Credits	**11.0**
Spring		
ARTS 503	Introduction to Creative Arts Therapy III	2.0
ARTS 512	Clinical Practicum III	1.0
ARTS 539	Art Therapy Group Supervision III	2.0
ARTS 540	Art Therapy Literature and Research	2.0
ARTS 541	Jungian Psychology for Art Therapists	2.0
ARTS 542	Group Dynamics: Art Therapy	2.0
	Term Credits	**11.0**
Second Year		
Fall		
ARTS 610	Clinical Internship I	3.0
ARTS 631	Processes and Materials in Art Therapy Counseling	2.0
ARTS 632	Advanced Art Therapy Process and Practice I	2.0
ARTS 634	Art Therapy Family Assessment	2.0
ARTS 637	Advanced Art Therapy and Counseling Group Supervision I	1.5

Elective Course[*]		1.0
	Term Credits	**11.5**
Winter		
ARTS 611	Clinical Internship II	3.0
ARTS 633	Advanced Art Therapy Process and Practice II	2.0
ARTS 638	Advanced Art Therapy and Counseling Group Supervision II	1.5
	Term Credits	**6.5**
Spring		
ARTS 612	Clinical Internship III	3.0
ARTS 636	Studio Art for Art Therapists	0.5
ARTS 639	Advanced Art Therapy and Counseling Group Supervision III	1.5
Elective course[*]		
	Term Credits	**5.0**

Total Credit: 57.0

[*]   Students must take one 1-credit elective course in their second year. ARTS 640, ARTS 642, and ARTS 643 are offered in Fall term, and ARTS 641 is offered in Spring term.

Additional Information

For additional information about the program, visit the College of Nursing and Health Professions Creative Arts Therapies (https://www.drexel.edu/cnhp/academics/departments/Creative-Arts-Therapies) web site.

Post-Master's Certificate in Dance Movement Therapy

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's
Number of Credits to Completion: 41.5
Instructional Delivery: Campus
Calendar Type: Quarter
Maximum Time Frame: 3 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 51.2302
Standard Occupational Classification (SOC) Code: 29-1129

About the Program

Dance/movement therapy is a body/mind-integrated approach to psychotherapy that uses expressive dance and movement processes to encourage the integration of emotional, cognitive, social, and physical functioning. Dance/movement therapy emphasizes the non-verbal realm of movement, touch, rhythm, and spatial interactions, as well as the congruence and connections between verbal and nonverbal modes of expression.

In this program, students build a strong foundation of theoretical knowledge and clinical application in dance/movement therapy (DMT). The program teaches and balances the art of DMT with the science that supports it. Using diagnostic knowledge, developmental and systems theories, and observational skills based in Laban Movement Analysis, our students learn to assess client functioning and formulate treatment goals. Using their expertise in the dance/movement modality and interactive, improvisational processes, students learn to address the patient's

needs in both group and individual therapy formats. They may design creative group tasks for fostering interaction and cohesion, or to guide an individual through a personal conflict or challenge.

Admissions

Admission requirements for the certificate program are similar to those for the MA program in Dance/Movement Therapy.

Curriculum

The Post-Master's Certificate in Dance/Movement Therapy consists of specialized coursework and supervised clinical experience. For those already holding a master's degree in a clinical mental health field, this certificate program will help prepare the learner for the Dance Therapist Registered credential (R-DMT) from the Dance/Movement Therapy Certification Board (http://www.adta.org) through the "Alternate Route".

Courses in the certificate program address categories delineated by the ADTA for Alternate Route Training in DMT:

- theory and practice in the field of dance/movement therapy
- movement observation and analysis

For the categories delineated by the Dance/Movement Therapy Certification Board in general mental health topics, the Department of Creative Arts Therapies offers courses for additional fees. Because the certificate courses are offered in the context of a master's DMT program that is approved by the American Dance Therapy Association, the courses qualify as approved for Alternate Route training in DMT.

Certificate courses can be taken on a part time basis over two or more years. The certificate program offers the requisite fieldwork and internship components on an optional basis for additional fees.

For additional information about admission to the program, visit the College of Nursing and Health Professions Creative Arts in Therapy (http://www.drexel.edu/artsTherapies) web site.

Required Courses

ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 519	Neuroscience: Concepts and Applications for Creative Arts Therapy	3.0
ARTS 552	Therapy Relationship Skills I	2.0
ARTS 553	Therapy Relationship Skills II	2.0
ARTS 554	Movement Observation I	2.0
ARTS 555	Laban Movement Analysis Lab	1.0
ARTS 556	Movement Observation II	2.0
ARTS 557	Dance/Movement Therapy Theory and Practice - Children I	2.0
ARTS 558	Dance/Movement Therapy Theory and Practice - Children II	2.0
ARTS 559	Introduction to Dance/Movement Therapy History and Literature	1.0
ARTS 563	Movement Perspectives in Human Development	2.0
ARTS 564	Group Dynamics and Therapy II: Dance/Movement Therapy	2.0
ARTS 651	Medical Dance/Movement Therapy	1.0
ARTS 654	Dance/Movement Therapy Theory and Practice III: Adults	2.0
ARTS 655	Multicultural Perspectives in Therapy II: Dance/Movement Therapy	2.0
ARTS 656	Mental Health Applications of Movement Analysis I	2.0
ARTS 657	Mental Health Applications of Movement Analysis II	2.0
ARTS 661	Family Dance/Movement Therapy: A Systems Approach	2.0
ARTS 662	Advanced Group Dance/Movement Therapy Skills I	2.0
ARTS 663	Advanced Group Dance/Movement Therapy Skills II	2.0
ARTS 699	Independent Study in Creative Arts Therapy	1.5
Recommended Electives		
ARTS 610	Clinical Internship I	
ARTS 611	Clinical Internship II	
ARTS 612	Clinical Internship III	
ARTS 652	The Kestenberg Movement Profile	
ARTS 658	Dance/Movement Therapy Advanced Group Supervision I	
ARTS 659	Dance/Movement Therapy Advanced Group Supervision II	
ARTS 660	Dance/Movement Therapy Advanced Group Supervision III	
Total Credits		**41.5**

Post-Master's Certificate in Music Therapy

Certificate Level: Graduate
Admissions Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 52.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 51.2305
Standard Occupational Classification (SOC) Code: 29-1129

About the Program

The Post-Master's Certificate in Music Therapy program is designed to help students develop advanced music therapy clinical skills in an academic health center setting. The program is the only music therapy training model housed in an academic health center. It is unique in that faculty members include mental health and medical professionals who assist students in integrating music therapy with current developmental, neuroscience, mental health, and medical foundations.

Didactic and clinical aspects are balanced to provide a foundation of theoretical knowledge and practical application. The evidence-informed curriculum integrates knowledge of music therapy with current theoretical approaches to assessment and treatment. Experiential core and music therapy modality courses are designed to help students develop the use of the self within the music therapy relationship.

About the Certificate

The certificate program is a 52.0 quarter credit course of study designed to meet the needs of qualified individuals who seek to become eligible to sit for the Board Certification Exam from the Certification Board for Music

Therapists (http://www.cbmt.org) (CBMT). The certificate program is designed for those with a master's degree in another clinical mental health specialty who wish to add a specialization in music therapy with eligibility to sit for the Board Certification exam, administered by the Certification board for Music Therapists. Each of the following courses addresses one or more competency areas delineated by the American Music Therapy Association. All are taught at the graduate level.

Admissions

Admission requirements for the certificate program are similar to those for the MA program in Music Therapy (p.   ). For additional information about admission to the program, visit the College of Nursing and Health Professions' Creative Arts Therapies (https://www.drexel.edu/cnhp/academics/departments/Creative-Arts-Therapies) web site.

Required Courses

ARTS 501	Introduction to Creative Arts Therapy I	2.0
ARTS 502	Introduction to Creative Arts Therapy II	2.0
ARTS 503	Introduction to Creative Arts Therapy III	2.0
ARTS 510	Clinical Practicum I: Observation	1.0
ARTS 511	Clinical Practicum II	1.0
ARTS 512	Clinical Practicum III	1.0
ARTS 573	Clinical Musical Improvisation I	2.0
ARTS 574	Clinical Musical Improvisation II	2.0
ARTS 575	Theories in Music Therapy I	2.0
ARTS 577	Music Therapy Skills I	2.0
ARTS 578	Music Therapy Skills II: Child Skills	2.0
ARTS 579	Music Therapy Skills III: Technological Applications	2.0
ARTS 580	Psychology of Music	2.0
ARTS 581	Music Therapy Group Supervision I	1.0
ARTS 582	Music Therapy Group Supervision II	1.0
ARTS 583	Music Therapy Group Supervision III	1.0
ARTS 610	Clinical Internship I	3.0
ARTS 611	Clinical Internship II	3.0
ARTS 612	Clinical Internship III	3.0
ARTS 670	Advanced Music Therapy Skills I	2.0
ARTS 671	Advanced Music Therapy Skills II	2.0
ARTS 672	Multicultural Perspectives in Music Therapy	2.0
ARTS 673	Advanced Music Therapy Group Supervision I	1.0
ARTS 674	Advanced Music Therapy Group Supervision II	1.0
ARTS 675	Advanced Music Therapy Group Supervision III	1.0
ARTS 676	Theories in Music Therapy II	2.0
ARTS 677	Advanced Music Therapy Skills III - Group	2.0
ARTS 678	Clinical Internship Laboratory: Musical Analysis	1.0
NEUR 534	Neuroscience	3.0
Total Credits		**52.0**

Post-Master's Certificate in Nurse Anesthesia

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 72.0
Instructional Delivery: Campus

Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 51.3804
Standard Occupational Classification (SOC) Code: 29-1151

The Post Master's Certificate (PMC) in Nurse Anesthesia program is a 72.0 quarter credit full-time program. The program offers 7.0 theoretical nursing and research credits, 9.0 quarter credit basic science component, 31.0 quarter credits of a didactic anesthesia component and a 25.0 credits in a clinical component. Upon successful completion program outcomes student is awarded a post master's certificate in nurse anesthesia and is eligible to take the national certification examination offered by the NBCRNA - Council on Certification of Nurse Anesthetists.

The nurse anesthesia program is accredited by the:

Council on Accreditation of Nurse Anesthesia Educational Programs
222 S. Prospect Ave, Suite 304
Park Ridge, IL 60068
847-692-7050

Admission Requirements

This certificate program is offered to those individuals who have earned a master's degree in nursing and seek further preparation in nurse anesthesia. Transcripts are reviewed and course work is determined on an individual basis. Contact the College of Nursing for more specific admission requirements (https://www.drexel.edu/cnhp/academics/post-masters/Certificate-PM-Nurse-Anesthesia).

Curriculum/Requirements

First Year

Term 1		Credits
Winter		
NURS 503	Basic Principles of Nurse Anesthesia	3.0
NURS 504	Overview of Nurse Anesthesia	3.0
NURS 550[*]	Advanced Clinical Assessment Diagnostic Reasoning Across the Lifespan	4.0
	Term Credits	**10.0**
Term 2		
Spring		
NURS 508	Nurse Anesthesia Clinical Practicum I	1.0
NURS 505	Chemistry and Physics	3.0
NURS 507	Nurse Anesthesia Pharmacology I	3.0
	Term Credits	**7.0**
Term 3		
Summer		
NURS 510	Advanced Principles of Nurse Anesthesia I	3.0
NURS 511	Nurse Anesthesia Pharmacology II	3.0
NURS 512	Nurse Anesthesia Clinical Practicum II	1.0
NURS 521	Advanced Pathophysiology I	3.0
	Term Credits	**10.0**
Term 4		
Fall		
NURS 515	Advanced Principles of Nurse Anesthesia II	3.0
NURS 516	Nurse Anesthesia Clinical Practicum III	2.0

NURS 522	Advanced Pathophysiology II	3.0
	Term Credits	**8.0**

Second Year

Term 5

Winter

NURS 517	Nurse Anesthesia Clinical Practicum IV	3.0
NURS 518	Advanced Principles of Nurse Anesthesia III	3.0
NURS 523	Advanced Pathophysiology III	3.0
NURS 530	Anesthesia Seminar	1.0
	Term Credits	**10.0**

Term 6

Spring

NURS 659	Advanced Principles of Nurse Anesthesia IV	3.0
NURS 683	Nurse Anesthesia Clinical Practicum V	3.0
	Term Credits	**6.0**

Term 7

Summer

NURS 684	Nurse Anesthesia Clinical Practicum VI	3.0
	Term Credits	**3.0**

Term 8

Fall

NURS 527	Evidence Based Approaches to Practice	3.0
NURS 687	Clinical Residency I	6.0
	Term Credits	**9.0**

Third Year

Term 9

Winter

NURS 688	Clinical Correlative Seminars	3.0
NURS 689	Clinical Residency II	6.0
	Term Credits	**9.0**

Total Credit: 72.0

*   1.0 credit Independent Study course may be substituted based upon review of MSN transcript.

Rehabilitation Sciences

Major: Rehabilitation Sciences
Degree Awarded: Master of Science (MS); Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 48.0 (MS); 93.0 (PhD)
Classification of Instructional Programs (CIP) code: 51.2308
Standard Occupational Classification (SOC) code: 29-1123

About the Program

The Doctor of Philosophy (PhD) in Rehabilitation Sciences program is designed to prepare physical therapists and other professionals to take leadership roles as researchers and educators in rehabilitation sciences,

and to conduct research that will ultimately impact the quality of life for individuals with limitations in motor function. Concentrations are offered in three areas:

Program Objectives

The PhD program prepares individuals for leadership, teaching and research roles in the profession. On completing the Doctor of Philosophy degree, graduates will be prepared to:

- Analyze the impact of movement dysfunction from multiple perspectives, including body function, activity, and participation.
- Analyze theory, research, and health care policy relevant to health promotion and rehabilitation to translate knowledge into clinical practice.
- Develop and evaluate innovative mechanisms, methods, interventions, and models of service delivery for health promotion and rehabilitation.
- Effectively communicate information orally through professional presentations and in writing through grant proposals and publications in peer-reviewed journals.
- Develop an ongoing area of research that is competitive for grant funding.
- Apply innovative teaching methods to a wide variety of situations, including the education of physical therapists and physical therapy students.

Concentrations

Student and faculty advisor collaboratively design an individualized plan of study based on common research interests. Prospective students are encouraged to explore our faculty research areas (https://www.drexel.edu/cnhp/academics/departments/Physical-Therapy/Research) and information on our PhD faculty mentors on our program website (https://www.drexel.edu/cnhp/academics/doctoral/DHSC-Rehabilitation-Sciences).

Degree Requirements

The core curriculum includes coursework in research and teaching. Concentration courses in clinical and basic science are selected based on the student's area of interest, objective for doctoral study, and dissertation research. Students work individually with a faculty mentor to complete the required research and teaching practica.

Requirements vary according to the student's previous degree. Students with master's degrees must successfully complete 48.0 credits; students with baccalaureate degrees must complete 93.0 credits. A comprehensive examination and a dissertation research project are required. The PhD degree can be completed in 3.5 to 4 years of full-time study for students who enter with a master's or DPT degree.

Additional Information

For more information, visit the Department of Physical Therapy and Rehabilitation Sciences web page.

Core Courses

NHP 762	Health Professional Education	3.0
RHAB 760	Academia for Rehabilitation Scientists	1.0
RHAB 761	Foundations of Rehabilitation Research	3.0
RHAB 815	Scientific Inquiry and Writing	3.0

RHAB 830	Dissertation Research	1.0-12.0
RSCH 770	Foundations in Research Methods	3.0
RSCH 759	Foundations of Biostatistics	3.0
RSCH 811	Intermediate Biostatistics	3.0
RSCH 812	Interpretation of Data	3.0
RSCH 813	Measurement Theory in Healthcare	3.0
Concentration/Elective Course Options		8.0-12.0

A minimum of 8 to 12 additional credits of courses are selected based on the student's concentration area and objectives for graduate study. Students may take courses from any concentration with the approval of their advisor and permission of the course instructor.

RHAB 763	Biomechanics in Rehabilitation
RHAB 764	Biomechanics in Human Movement
RHAB 765	Introduction to Movement Science
RHAB 817	Sensors & Transducers in Rehabilitation
PTRS 650	Motor Control and Learning Rehabilitation
PTRS 651	Applied Tissue Biomechanics
PTRS 740	Issues in Pediatric Health & Rehabilitation
PTRS 758	Evidence-Based Rehabilitation
PTRS 760	Pediatric Decision Making
PTRS 761	Pediatric Clinical Application
PTRS 772	Selected Topics in Pediatrics
PTRS 764	Geriatric Rehabilitation
PTRS 766	Extremity Rehabilitation
PTRS 765	Spinal Rehabilitation
PTRS 767	Foundations in Hand Therapy
PTRS 768	Upper Quarter Joint Pathology
PTRS 769	Nerve Injuries of the Upper Quarter
PTRS 770	Diseases That Affect the Hand
PTRS 771	Work Injury Management
PTRS 780	Foundations of School-based Practice
PTRS 781	Advanced Competencies in School-based Practice

Additional courses (as approved) [*]

Practica and Independent Study		
RHAB 820	Independent Study	1.0-4.0
RHAB 823	Research Practicum	1.0-6.0
RHAB 824	Teaching Practicum I	1.0
RHAB 825	Teaching Practicum II	2.0
RHAB 826	Teaching Practicum III	3.0
Total Credits		**48.0**

[*]   Students also may take courses from other departments and schools in the University with approval of their advisor and permission of the course instructor.

Master of Health Sciences (MHS): 45.0 quarter credits

Master of Health Sciences

Individuals cannot enroll directly in the Master of Health Sciences in Rehabilitation Sciences program. Requirements for the degree completion include successful completion of 45.0 credit hours concluding with a case study or a clinical project.

Upon completion of the MHS program, graduates will be prepared to:

- Analyze the impact of injury or disease process on musculoskeletal or neuromuscular function within a specific population, including orthopedics, pediatrics, and hand rehabilitation.
- Improve their practice through clinical decision-making that is consistent with concepts of health promotion, client-centered care and current best evidence.
- Facilitate the transfer of health care policy and research findings into clinical practice.
- Evaluate methods of service delivery and intervention strategies and procedures at individual and program levels.
- Serve effectively as clinical educators and consultants to consumers and colleagues.
- Engage in professional life-long learning and contribute to the field of rehabilitation.

Additional Information

For more information, visit the Department of Physical Therapy and Rehabilitation Sciences (https://www.drexel.edu/cnhp/academics/departments/Physical-Therapy) web page.

Master of Health Sciences (MHS): 45.0 quarter credits

Core Requirements		
RSCH 519	Introduction to Biostatistics	3.0
RSCH 523	Methods for Health Research	3.0
PTRS 721	Teaching Concepts in Rehabilitation	3.0
PTRS 651	Applied Tissue Biomechanics	3.0
PTRS 758	Evidence-Based Rehabilitation	4.0
PTRS 650	Motor Control and Learning Rehabilitation	3.0
Concentration		

Students select a minimum of 16-18 credits in one of the following concentrations.   16.0-18.0

Hand and Upper Quarter Rehabilitation Concentration Options		
PTRS 767	Foundations in Hand Therapy
PTRS 768	Upper Quarter Joint Pathology
PTRS 769	Nerve Injuries of the Upper Quarter
PTRS 770	Diseases That Affect the Hand
PTRS 771	Work Injury Management

Pediatrics Concentration Options [*]		
PTRS 740	Issues in Pediatric Health & Rehabilitation
PTRS 760	Pediatric Decision Making
PTRS 761	Pediatric Clinical Application
PTRS 772	Selected Topics in Pediatrics

Orthopedics Concentration Options [*]		
PTRS 765	Spinal Rehabilitation
PTRS 766	Extremity Rehabilitation
RHAB 763	Biomechanics in Rehabilitation
RHAB 764	Biomechanics in Human Movement
RHAB 765	Introduction to Movement Science
PTRS 590	Advanced Musculoskeletal Anatomy
PTRS 767	Foundations in Hand Therapy
PTRS 768	Upper Quarter Joint Pathology
PTRS 769	Nerve Injuries of the Upper Quarter
PTRS 770	Diseases That Affect the Hand
PTRS 771	Work Injury Management

Electives [*]

Select at least two of the following:		3.0-5.0
PTRS 612	Pharmacotherapeutics	
RHAB 824	Teaching Practicum I	
RHAB 825	Teaching Practicum II	
RHAB 826	Teaching Practicum III	
RHAB 816	Special Topics	
RHAB 820	Independent Study	
Final Project		
PTRS 786	MHS Final Project I	1.0-2.0
PTRS 787	MHS Final Project II	1.0-2.0
Total Credits		**45.0**

[*] Additional courses (as approved). Contact the Rehabilitation Sciences Master of Health Science Program (https://www.drexel.edu/cnhp/academics/departments/Physical-Therapy) for more details.

Facilities

Teaching Facilities and Resources

Most classes are held in lecture halls, classrooms, or laboratories on the Center City (Health Sciences) Campus of Drexel University. The entire campus has wireless capability for easy internet access. The Department of Physical Therapy and Rehabilitation Sciences has two state-of-the-art dedicated laboratories. Our teaching resources also include supported distance learning technology. Instructional materials are provided through text, graphics, audio and video formats and are available online through a course management system 24 hours a day. Our online courses are highly interactive through the use of web discussion boards, audio chat tools, and video conferencing.

Research Facilities

The department's research facilities include over 9,000 square feet of well-equipped research laboratory space (Biomechanics, Gait, Pediatrics, and Neuromuscular Performance Labs), with equipment including force plates, EMG, motion analysis and human performance measurement equipment. This space includes conference rooms, PhD and post doc offices and is located next door to the Colleges 14,000 square feet, multi-disciplinary clinical practice.

The Department of Physical Therapy and Rehabilitation also values community partners as a central part of the research resources. Many faculty and students are involved in community-based research through collaborations with CanChild Centre, 11th Street Family Health Center, and numerous pediatric hospitals, out-patient facilities, and early intervention providers. Faculty are collaborating on research projects with nationally and internationally known researchers on several multi-site funded projects.

Physical Therapy and Rehabilitation Sciences Faculty

Maria Benedetto, DPT *(University of Puerto Rico; Columbia University)*. Associate Clinical Professor. Motor learning and motor control in pediatrics; timed ambulation; obstacle course for children with and without motor disabilities.

Lisa Ann Chiarello, PT, PhD, PCS *(Hahnemann University; Ithaca College) Director, PhD Program*. Professor. Models of service delivery in early intervention; parent-child relationship and the use of play; family-centered care.

David Ebaugh, PT, PhD *(Drexel University)*. Assistant Professor. Quantitative analysis of movement in patients with shoulder pathology; differential diagnosis of shoulder problems; orthopedic examinations and interventions.

Jane Fedorczyk, PT, PhD, CHT, ATC *(Beaver College) Director, Post-Professional Clinical Programs*. Associate Clinical Professor. Hand and upper extremity injuries related to repetitive movement including tendinopathies and nerve compression syndromes.

Kevin E. Gard, DPT, OCS *(Temple University) Vice-Chair, Department of Physical Therapy and Rehabilitation Sciences and Director, Professional Doctor of Physical Therapy Program*. Associate Clinical Professor. Orthopedics; sports medicine.

Noel Goodstadt, DPT, OCS, CSCS *(Pennsylvania State University; Hahnemann University; Temple University)*. Assistant Clinical Professor. Orthopedics, musculoskeletal disorders.

Jan Meiers, PT, DPT, GCS *(Temple University) Assistant Director of Clinical Education*. Assistant Clinical Professor. Wellness in the geriatric population.

Kathryn D. Mitchell, PT, DPT, NCS *(Temple University) Assistant Director of Clinical Education*. Assistant Clinical Professor. Adult neuromuscular rehabilitation, vestibular rehabilitation, and balance and falls; clinical health informatics.

Margaret O'Neil, PT, PhD, MPH *(MCP Hahnemann University; Duke University; University of North Carolina at Chapel Hill)*. Associate Professor. Measurement of and interventions to improve physical activity and fitness levels and promote participation in children and youth with who are overweight/obese and those with physical disabilities (especially cerebral palsy).

Margo Orlin, PT, PhD *(Drexel University) Interim Chair, Department of Physical Therapy and Rehabilitation Sciences*. Associate Professor. Gait and function in children with developmental disabilities, evaluation of musculoskeletal interventions for children with cerebral palsy; enhancing participation for children and adolescents with cerebral palsy.

Robert J. Palisano, PT, ScD, FAPTA *(Boston University)*. Professor. Motor function of children with cerebral palsy, mobility and self-care in children and adolescents with cerebral palsy, evaluation of therapy services in early intervention, outcomes measurement.

Deborah Rose, PT, DPT, PCS *(Drexel University)*. Adjunct Instructor. Pediatric clinical specialist.

Patricia Rubertone, MSW, MPT *(Temple University; Hahnemann University) Director of Clinical Education*. Assistant Clinical Professor. Student learning; course design.

Patricia A. Shewokis, PhD *(University of Georgia)*. Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalograpy (EEG) and methodology and research design.

Sheri Silfies, PT, PhD *(MCP Hahnemann University) Research Lab Coordinator*. Associate Professor. Identification and treatment of impairments in neuromuscular control of trunk mobility and postural

stability in patients with low back pain; focusing on mechanism of recurrent low back pain.

Susan Smith, PT, PhD *(University of Connecticut, Texas Woman's University) Associate Dean for Research and Health Professions, Graduate Education, CNHP.* Associate Professor. Health promotion and interventions for manifestations of low bone mass in women; quantitative evaluation and interventions in orthopedic physical therapy with an emphasis on spinal pain and dysfunction.

Sarah Wenger, PT, DPT, OCS *(Arcadia University; Temple University) Coordinator of Experiential Learning.* Assistant Clinical Professor. Health, wellness and fitness, models for preventative physical therapy.

Interdepartmental Faculty

Joseph A. Rubertone, MPT, PhD *(West Virginia University).* Associate Clinical Professor. Connectivity of vestibular nuclear complex, brain tumor imaging, and clinical studies pertaining to the effectiveness of stroke rehabilitation.

Women's Health/Gender-Related Nurse Practitioner Post-Master's Certificate

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 37.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.3822
Standard Occupational Classification (SOC) Code: 29-1171

The online Women's Health/Gender Related Nurse Practitioner program supplies nurses with the skills necessary to provide advanced care to women and their partners throughout the lifespan with a specialized emphasis on reproductive and gynecologic health needs. Graduates are also qualified to provide a myriad of gender related services focusing on health promotion and disease prevention that range from well-woman care, prenatal and postpartum care, and common and complex women's health issues in both primary settings and women's health specialty practices. Additionally, this track offers the opportunity for students to work in transdisciplinary simulated scenarios to promote a better understanding and respect of discipline-specific roles, improve existing communication and collaboration within disciplines, and initiate teamwork development in order to promote patient safety and high-quality patient care

This certificate is offered to those individuals who have earned a master's degree in nursing and seek further preparation to become a Women's Health/Gender Related Nurse Practitioner (WH/GRNP). Transcripts will be reviewed and course work will be determined on an individual basis. Students meet on campus for a mandatory On-Campus Intensive (OCI) learning experiences, simulation, and evaluation. Graduates are eligible to sit for the NCC's Women's Health/Gender Related Nurse Practitioner Certification Examination.

Admission Requirements

- A Master's degree with a major in nursing (MSN) from a regionally accredited program with a cumulative grade point average of at least 3.0 on a scale of 4.0.
- A copy of your current, unrestricted United States RN license or eligibility for licensure as a registered nurse. License verification from your nursing license registry website are acceptable. Once accepted, applicants must have a current RN license in the state of Pennsylvania. In addition, students are required to have a RN Nursing License for the state in which the clinical practicum rotations are being completed.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online through a password secured link or website (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Click here to use our Transcript Look-up Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If you attended a Diploma School of Nursing and the school was affiliated with a college/university, the official transcript must be submitted from the college for any non-nursing courses for which you received credit.
- Current Curriculum vitae and/or resume detailing work experience, including specific job responsibilities and departments.
- Two professional letters of recommendation (from either a previous or immediate supervisor and/or a former nursing faculty member who can attest to the applicant's clinical knowledge, skill and potential aptitude for graduate study). References will not be accepted from colleagues or family members. Drexel University Online now accepts electronic letters of recommendation. Click here (http://www.drexel.edu/apply/recommend) for instructions regarding their submission. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal statement (800-1,600 words) that will give the Admissions Committee a better understanding of why you are choosing this particular program of study, your plans upon completion of this program, and how your current work experience will enhance your experience in this program.
- International applicants: Please click here (http://www.drexel.com/online-degrees/nursing-degrees/cert-pm-apmhnp/international.aspx) to view additional requirements.
- Once the student is accepted into the program, a GAP analysis may be completed to determine credit eligibilty for previously faculty supervised clinical hours. Note: The Gap Analysis is not mandatory for acceptance into the program. If the prospective student chooses to have a Gap Analysis completed, it is performed after confirmed admissions.
- A personal interview may be required (online or telephone options will be available).

Program of Study

All incoming post-master's students have the opportunity for previous coursework to be evaluated on an individual basis for transfer of credit.

Students should check with the program Transfer Credit Evaluator for the exact schedule. The mandatory on campus visits are as follows:

- *2nd Year, Summer Term* – students come to campus during the first clinical course for the On-Campus Intensives (OCI).
- *3rd Year, Fall Term* – students come to campus during the second clinical course for 2-3 days for a standardized patient lab experience (SPL) and/or human patient simulation (HPS) experience.
- *3rd Year, Winter Term* – students come to campus during the third clinical course for 2-3 days for a second standardized patient lab experience (SPL) and/or human patient simulation experience (HPS).
- *3rd Year, Spring Term* – students come to campus during the fourth clinical course for the On-Campus Intensives (OCI).

Required Courses

Support Courses		
NURS 548	Advanced Pathophysiology	3.0
NURS 549	Advanced Pharmacology	3.0
NURS 550	Advanced Clinical Assessment & Diagnostic Reasoning Across the Lifespan	4.0
NURS 664	Professional Issues for Nurse Practitioners	1.0
NURS 680	Primary Care for Women's Health	3.0
NURS 682	Pharmacology for the Women's Health Nurse Practitioner	3.0
Concentration Courses		
NURS 690	WHNP I: Mngmnt & Care of the Common Gyn and Gender Related Issues throughout the Lifespan	5.0
NURS 691	WHNP II: Mngmnt & Care of the Complex Gyn and Gender Related Issues of Women throughout the Lifespan	5.0
NURS 692	WHNP III: Management & Care of the Low Risk Obstetrical and Post Partum Needs of Women and Families	5.0
NURS 693	WHNP IV: Mngmnt & Care of the High Risk Obstetrical and Post Partum Needs of Women and Families	5.0
Total Credits		**37.0**

LeBow College of Business

About the College

LeBow College of Business (http://www.lebow.drexel.edu) is among just 25 percent of business schools nationwideaccredited by AACSB-- Association to Advance Collegiate Schools of Business. Drexel LeBow offers one MBA degree delivered in different formats – face-to-face or online, part-time or full-time, and at a satellite campuses in Malvern, PA. Additionally, the Drexel LeBow MBA offers several fields of concentration within the MBA: finance, marketing, entrepreneurship/innovation, business analytics and healthcare management. Options include:

- **Full-Time**: one-year MBA and traditional two-year MBA
- **Part-time**: LEAD (an accelerated MBA), the flexible professional MBA, and executive MBA.
- **Online**: MBA Anywhere and MBA in healthcare management

Prospective students to the Drexel LeBow MBA programs are not required to have undergraduate degrees in business.

In addition to MBA programs, Drexel LeBow offers MS degrees in accounting, business analytics, economics, finance, leadership, and marketing.

Majors

Certificates

About the Curriculum

Graduate business programs at Drexel University's LeBow College of Business provide a high-quality education that blends theory and practice. Students receive individualized attention to help them achieve short-term and long-term career goals.
The Drexel LeBow MBA enrolls approximately 800 students representing diverse backgrounds, 20 percent of whom are enrolled full-time. Approximately 50 percent of the full-time students are international. Drexel LeBow MBA students have come from more than 40 countries in Asia, Europe, South America and Canada.

The part-time MBA programs account for 60 percent of the enrolled students with another 20 percent enrolled in online MBA programs.

Following in the mission of the University's founder, A.J. Drexel, to provide practical applications of learning, the Drexel LeBow faculty have backgrounds in corporate management and scholarly research. Drexel LeBow faculty combine strengths in teaching and research. They also enjoy strong ties with the corporate community. Corporate and entrepreneurial leaders add to the full-time faculty by coming to campus as guest lecturers or as adjunct professors.

Centers and Facilities

This marriage of academic rigor and practical applications can also be seen in the development of the school's Centers of Excellence. Centers of Excellence are catalysts for research and innovation, think tanks for nationally significant trends and issues, and incubators for opportunities in business and integration among disciplines. LeBow's Centers of Excellence provide students with meaningful experiential learning and impact the performance of business in our region and around the world. As part of the curriculum Drexel LeBow MBA students will take courses which reside in the centers and will see firsthand how practical learning is applied.
The Centers are:

- Center for Corporate Reputation Management (https://www.lebow.drexel.edu/academics/centers/corporate-reputation-management)
- Sovereign Institute for Strategic Leadership (https://www.lebow.drexel.edu/academics/centers)
- Center for Corporate Governance (https://www.lebow.drexel.edu/academics/centers/corporate-governance)
- Dana and David Dornsife Center for Experiential Learning (https://www.lebow.drexel.edu/academics/centers/experiential-learning)

Facilities

In fall 2013, LeBow College opened its 12-story, Gerri C. LeBow Hall, with a finance trading lab, behavioral studies lab and integrated teaching technology in all classrooms. The new building features two lecture halls, 15 classrooms of varying sizes and seating configurations, including case study rooms and cluster classrooms designed to facilitate group work. Other amenities consist of extensive areas of student spaces, including 12 collaboration rooms, two quiet study areas, and 3,500 square feet of student lounges. Gerri C. LeBow Hall brings together faculty, students and staff, in a state of the art building on the University City campus.

Certificate in Advanced Business

Certificate Level: Post-graduate
Admission Requirements: Master's degree or higher
Certificate Type: Post-Master's Certificate
Number of Credits to Completion: 12.0
Instructional Delivery: Campus, Online, Hybrid
Calendar Type: Quarter
Expected Time To Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.0201
Standard Occupational Classification (SOC) Codes: 11-1021, 13-0000

The Drexel LeBow Advanced Business Certificate (ABC) program is available to applicants possessing an earned master's degree or doctoral degree from a fully accredited university or college. The program is designed to permit qualified candidates the opportunity to update their skills in a professional field of specialization in which they have had

previous academic experience, or to acquire competence in a new business discipline.

The post-master's ABC program requires completion of a four-course sequence and may include the following specialization areas:

- business analytics
- entrepreneurship
- finance
- leadership
- marketing
- or a customized certificate option

The ABC program is administered by the Krall Center Corporate and Executive Education (http://www.lebow.drexel.edu/corporate-services/corporate-and-executive-education) in Drexel LeBow College of Business. Participants in this part-time certificate program have a three-year maximum timeframe within which to complete the certificate requirements. ABC students are enrolled in courses in Drexel LeBow MBA sections pending availability.

Upon acceptance to the ABC program, students will meet with an advisor to review program/course prerequisites (if applicable), and create a plan of study within one of the programs specializations. Sample course sequences in the specialization areas are listed below.

The ABC program leads to a Post-Master's Certificate. The credits earned in the certificate are not applicable to any current or future degree program offered by Drexel University unless all applicable entrance criteria for the anticipated program are met.

Certificate Requirements

After completing the four-course series, and receiving at least a 3.0 GPA for the certificate courses, students will receive a Post-Master's Certificate. Continuing Education Units (CEU) credits and/or Continuing Professional Educational (CPE) credits may be applicable.

For further ABC information, including how to apply to the program, contact the Krall Center for Corporate and Executive Education:
215.895.0578
executive@drexel.edu

Sample Sequences

All sample sequences are subject to change based on availability and individual student academic and professional background.

12.0 quarter credits

Sample Business Analytics sequence:

STAT 601	Business Statistics	3.0
FIN 642	Business Conditions and Forecasting	3.0
MIS 632	Database Analysis and Design for Business	3.0
STAT 632	Datamining for Managers	3.0

Sample Entrepreneurship sequence:

FIN 635	Entrepreneurial Finance	3.0
MGMT 650	Corporate Venturing	3.0
MGMT 652	New Venture Planning	3.0
MKTG 654	Corporate Brand & Reputation Management	3.0

Sample Finance sequence:

FIN 601	Corporate Financial Management	3.0
FIN 602	Advanced Financial Management	3.0
FIN 640	Mergers and Acquisitions	3.0
FIN 610	Corporate Governance	3.0

Sample Leadership sequence:

MGMT 602	Managing Technology Innovation	3.0
MGMT 780	Strategic Management	3.0
ORGB 625	Leadership and Professional Development	3.0
ORGB 631	Leading Effective Organizations	3.0

Sample Marketing sequence:

MKTG 601	Marketing Strategy & Planning	3.0
MKTG 622	Buyer Behavior Theory	3.0
MKTG 634	Integrated Marketing Communications Management	3.0
MKTG 638	New Product Planning, Strategy, and Development	3.0

Certificate in Leadership

Certificate Level: Graduate/Post-graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Graduate
Number of Credits to Completion: 12.0
Instructional Delivery: Campus, Online, Hybrid
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.0213
Standard Occupational Classification (SOC) Code: 13-1111

The coursework in this certificate offers students multiple perspectives of leadership, which include leadership of self, groups and of organizations. Through the coursework, opportunities are also provided to enhance persuasion and negotiations skills, as well as to develop and implement technological change.

The coursework in this certificate offers students multiple perspectives of leadership, which include leadership of self, groups and of organizations.

Requirements

MGMT 602	Managing Technology Innovation	3.0
ORGB 625	Leadership and Professional Development	3.0
ORGB 631	Leading Effective Organizations	3.0
ORGB 640	Negotiations for Leaders	3.0
Total Credits		**12.0**

Executive MBA Program

Major: Business Administration
Degree Awarded: Master of Business Administration (MBA)
Calendar Type: Quarter
Total Credit Hours: 51.0
Classification of Instructional Programs (CIP) code: 52.0101
Standard Occupational Classification (SOC) code: 11-1021

About the Program

The Executive MBA program is designed for experienced professionals with a minimum of 7 years of experience including two years in management functions. Executive MBA students have an average of

15 years of professional experience. The program stresses leadership, strategic thinking, and working effectively in a team environment.

The Executive MBA of LeBow College is an accelerated program designed to help experienced professionals leverage valuable work experience to maximize leadership potential. The Executive MBA Program is closely aligned with the needs of students and the business community. The program aims to produce business leaders who:

- communicate effectively as leaders;
- are skilled at innovative thinking;
- can convert ideas into actions;
- understand global business and management;
- can make informed and ethical decisions.

The program is designed for students to learn within a small group (typically 20-30 students) who begin and complete the program together. Students learn from faculty as well as fellow classmates in a dynamic, interactive environment. Networking is a crucial part of the Executive MBA experience. Executive MBA alumni form a close-knit and engaged community.

The curriculum is distinct from that of a traditional MBA, which emphasizes knowledge a practitioner needs; the Executive MBA Program focuses on what decision makers need to know. Leadership workshops and executive coaching are interwoven throughout the 20-month program.

Program Delivery

The Executive MBA Program begins each September with a three-day immersion phase in which students spend a concentrated period working with fellow students and laying the foundations for subsequent coursework and collaboration. The program meets one Friday and two Saturdays to minimize time away from the office and home while keeping students on a steady path to completion in 20 months. One week per month is an on-line or project week. To close the program, students participate in a capstone 10-day international residency.

Additional Information

For additional information about the program, visit the Executive MBA (http://www.lebow.drexel.edu/Prospects/MBA/Executive) web page.

Admission Requirements

The EMBA program has separate admission procedures. A personal interview is required. Students admitted to the program have an average of 15 years work experience and significant potential for advancement in their organizations. A minimum of 7 years of professional experience (including 2 years of management) is required. Students must be admitted to the Executive MBA program to register for EMBA cohorted classes.

For further information, please contact:

Mark Dierkes
Director of Recruitment
Executive MBA Program
484.595.0415
med24@drexel.edu (elie.farhat@drexel.edu)

About the Curriculum

A major strength of the LeBow Executive MBA program is the focus on leadership development. At the core of this instruction is a team-based learning approach. Designed to help enhance the transfer of experiences, each student will progress through the program in diverse teams. During orientation, students participate in team building exercises in which students work together to achieve common goals. Throughout the program, students earn credits towards a Leadership Certificate sponsored by the LeBow Institute for Strategic Leadership.

The Executive MBA is closely aligned with the needs of students and the business community and centers around four relevant and comprehensive modules. Starting with Enterprise Management, the program follows a sequential plan of study, building upon material learned from each of the previous modules. Students explore and apply the core business disciplines of finance, economics, and accounting. In the second year, students take strategy-based classes that require the application and synthesis of knowledge gained earlier in the program. At the end of the program the learning focuses on global business management, including a 10-day international residency.

Foundation Courses

This module is designed to orient students to business concepts, applications and decision making in accounting, finance and economics. Specific courses include:

- Managing the Total Enterprise (business simulation)
- Measuring and Maximizing Financial Performance
- Principles of Macro and Micro Economics

Functional Core

This module is designed to build a solid core of advanced business learning, and will expose students to the latest academic trends from our internationally recognized research faculty. Specific courses include:

- Managerial Accounting
- Corporate Finance
- Business Statistics
- Marketing Strategy and Planning
- Operations Management
- Managerial Economics

Technology Management & Business Analytics

This module is designed to develop planning skills and an understanding of constantly emerging technological trends. Specific courses include:

- Managing Technological Innovation
- MIS: Strategic Alignment
- Fundamentals of Business Analytics

Strategic Leadership

This module is designed to help professionals increase their leadership ability by exposing them to the latest self-assessment tools, industry best practices and strategies. Specific courses include:

- Mergers & Acquisitions and Corporate Governance
- Strategic Management
- International Business Management
- International Residency Seminar

Professional Leadership

- Leadership & Professional Development
- Students complete a Leadership Specialization program on topics as team dynamics, building and leveraging networks, ethics, and leading in dynamic environments. These "short courses" are integrated throughout the EMBA program.

Executive Coaching

Students work individually with an executive coach during and beyond the 20-month program to design and implement a personal career development plan and reinforce leadership skills.

MBA Programs

Major: Business Administration
Degree Awarded: Master of Business Administration (MBA)
Calendar Type: Quarter
Total Credit Hours: 51.0
Classification of Instructional Programs (CIP) code: 52.0101
Standard Occupational Classification (SOC) code: 11-1021; 11-2022; 11-9199

About the MBA

Drexel University's innovative, high-quality MBA program is recognized for its excellence and for its preparation of students for successful professional careers. We seek to attract and retain students with excellent undergraduate academic records and a commitment to graduate education. From its inception, Drexel has been a technology-oriented university, and we are committed to focusing our graduate curricula to reflect the importance and use of technology in both business and not-for-profit organizations.

Goals and Objectives

The MBA program is designed to:

- Integrate the foundations of business, problem-solving, and decision-making skills; organization theory; and practical aspects of institutional management
- Prepare students for managerial positions in business and other institutions
- Offer concentrations in various areas of management
- Capitalize on communication skills, people skills, global perspectives, technological competence, pragmatic emphasis, and ethical perspectives

Students selecting a concentration can choose from the following options:

- Business Analytics
- Finance
- Healthcare Management *(not available in full-time MBA program)*
- Entrepreneurship/Innovation Management
- Marketing

Full-time, Part-Time, Online and Accelerated Options

The College offers one MBA degree delivered in different formats: – face-to-face or online, part-time or full-time, and at a satellite campus in Malvern, PA. Additionally, the Drexel LeBow MBA offers several fields of concentration within the MBA. Visit LeBow College's web site for

information about additional MBA options (http://www.lebow.drexel.edu/Prospects/MBA).

Degree Requirements

The Master of Business Administration (MBA) curriculum remains firmly grounded on the best features of the "traditional" MBA as it has evolved over half a century. Among these features is a broad overview of business, complemented by at least one area of specialization.

Students selecting a concentration can choose from the following options:

- Business Analytics
- Finance
- Healthcare Management *(not available in full-time MBA program)*
- Entrepreneurship/Innovation Management
- Marketing

Foundation Courses		
BUSN 501	Measuring and Maximizing Financial Performance	3.0
BUSN 502	Essentials of Economics	3.0
Core Curriculum		
ACCT 601	Managerial Accounting	3.0
ECON 601	Managerial Economics	3.0
FIN 601	Corporate Financial Management	3.0
MGMT 601	Managing the Total Enterprise	3.0
MGMT 602	Managing Technology Innovation	3.0
MKTG 601	Marketing Strategy & Planning	3.0
ORGB 625	Leadership and Professional Development	3.0
POM 601	Operations Management	3.0
STAT 601	Business Statistics	3.0
Flexible Core Sequence		
Students select two courses from the following list of flexible core courses:		6.0
Baida Center for Entrepreneurship		
MGMT 650	Corporate Venturing	
MGMT 652	New Venture Planning	
Center for Corporate Governance		
BLAW 605	Legal Options in Decision Making	
FIN 610	Corporate Governance	
Center for Corporate Reputation Management		
MKTG 654	Corporate Brand & Reputation Management	
MKTG 790	Seminar In Marketing Management	
International Business/Studies		
INTB 620	International Business Management	
MIS 651	Information Systems Outsourcing Management	
Sovereign Institute for Strategic Leadership		
ORGB 631	Leading Effective Organizations	
ORGB 640	Negotiations for Leaders	
Capstone Course		
MGMT 780	Strategic Management	3.0
Concentration Courses		9.0
Students selecting a concentration can choose from the following options:		
Business Analytics		
Finance		

	Healthcare Management	
	Marketing	
	Entrepreneurship/Innovation Management	
Total Credits		**51.0**

Business Analytics Concentration

The Business Analytics concentration prepares students to make good business decisions with fact-based analysis and an understanding of business performance from a systems view, using statistical and quantitative analysis of data as well as explanatory and predictive modeling.

Requirements

STAT 632	Datamining for Managers	3.0
Select two of the following:		6.0
ECON 650	Business & Economic Strategy: Game Theory & Applications	
FIN 642	Business Conditions and Forecasting	
MKTG 606	Customer Analytics	
MIS 630	Inter-Active Decision Support Systems	
MIS 633	Predictive Business Analytics with Relational Database Data	
OPR 601	Managerial Decision Models and Simulation	
OPR 626	System Simulation	
POM 625	Supply Chain Management	
STAT 634	Quality & Six-Sigma	
STAT 636	Experimental Design	
Total Credits		**9.0**

Finance Concentration

Required Courses

Select two of the following:		6.0
FIN 602	Advanced Financial Management	
FIN 622	Financial Institutions & Markets	
FIN 624	Risk Management	
FIN 626	Investment Management	
FIN 635	Entrepreneurial Finance	
FIN 640	Mergers and Acquisitions	
FIN 642	Business Conditions and Forecasting	
FIN 648	International Financial Management	
FIN 790	Seminar in Finance	
Electives		
Select one of the following:		3.0
BLAW 620	Legal Aspects of Employment	
ECON 614	Macroeconomics	
BLAW T680	Special Topics in BLAW	
ECON 630	International Economics	
ECON 650	Business & Economic Strategy: Game Theory & Applications	
INTB 632	Economic Analysis of Multinational Corporations	
MGMT 655	Knowledge Management	
MIS 624	E-Commerce Systems I	
MIS 630	Inter-Active Decision Support Systems	
MKTG 630	Global Marketing	

MKTG 650	Marketing Management Cases and Problems	
OPR 601	Managerial Decision Models and Simulation	
POM 620	Management of Manufacturing Firms	
POM 624	Management of Service Firms	
STAT 634	Quality & Six-Sigma	
Total Credits		**9.0**

Healthcare Management Concentration

This specialized, cohorted, online program was developed together with industry representatives. The custom program is designed for professionals in the pharmaceutical and healthcare industries to help achieve new understanding and advance students' careers by integrating business strategy with science and technology and the unique perspective of the industry.

Four of the 17 courses offered are in-person residencies over three- to six-day on-site sessions at the beginning, middle, and end of the program. The remainder of the courses are delivered in an online format for ultimate flexibility.

This program begins in the spring and takes approximately 24 months to completion.

BUSN 651	Healthcare Business Practice I: Foundations	3.0
BUSN 652	Healthcare Business Practice II	3.0
BUSN 653	Healthcare Business Practice III: Capstone	3.0
Total Credits		**9.0**

Marketing Concentration

Required Courses

Select two of the following:		6.0
MKTG 606	Customer Analytics	
MKTG 607	Marketing Experiments	
MKTG 622	Buyer Behavior Theory	
MKTG 624	Channels of Distribution Management	
MKTG 630	Global Marketing	
MKTG 634	Integrated Marketing Communications Management	
MKTG 636	Business to Business Marketing	
MKTG 638	New Product Planning, Strategy, and Development	
MKTG 646	Services Marketing	
MKTG 650	Marketing Management Cases and Problems	
MKTG 652	Marketing Information Management and Research	
Electives		
Select one of the following:		3.0
BLAW T680	Special Topics in BLAW	
ECON 614	Macroeconomics	
ECON 630	International Economics	
FIN 642	Business Conditions and Forecasting	
FIN 648	International Financial Management	
INTB 632	Economic Analysis of Multinational Corporations	
INTB 790	Seminar in International Business	
MGMT 655	Knowledge Management	
MIS 624	E-Commerce Systems I	
MIS 630	Inter-Active Decision Support Systems	

MIS 632	Database Analysis and Design for Business	
OPR 601	Managerial Decision Models and Simulation	
POM 624	Management of Service Firms	
POM 625	Supply Chain Management	
STAT 634	Quality & Six-Sigma	
Total Credits		**9.0**

Entrepreneurship/Innovation Management Concentration

Required Courses

Select two of the following:		6.0
BLAW 620	Legal Aspects of Employment	
BLAW 646	Legal Issues in New Ventures	
FIN 635	Entrepreneurial Finance	
MGMT 640	Strategic Human Resource Management	
MGMT 655	Knowledge Management	
MIS 624	E-Commerce Systems I	
MIS 630	Inter-Active Decision Support Systems	
MIS 632	Database Analysis and Design for Business	
MKTG 638	New Product Planning, Strategy, and Development	

Electives

Select one of the following:		3.0
ECON 614	Macroeconomics	
ECON 630	International Economics	
ECON 650	Business & Economic Strategy: Game Theory & Applications	
FIN 602	Advanced Financial Management	
FIN 624	Risk Management	
FIN 640	Mergers and Acquisitions	
FIN 642	Business Conditions and Forecasting	
FIN 648	International Financial Management	
FIN 649	Comparative Financial Analysis	
INTB 632	Economic Analysis of Multinational Corporations	
INTB 790	Seminar in International Business	
MGMT 655	Knowledge Management	
MKTG 622	Buyer Behavior Theory	
MKTG 624	Channels of Distribution Management	
MKTG 630	Global Marketing	
MKTG 634	Integrated Marketing Communications Management	
MKTG 646	Services Marketing	
MKTG 650	Marketing Management Cases and Problems	
ORGB 640	Negotiations for Leaders	
OPR 601	Managerial Decision Models and Simulation	
POM 620	Management of Manufacturing Firms	
POM 624	Management of Service Firms	
POM 625	Supply Chain Management	
STAT 634	Quality & Six-Sigma	
Total Credits		**9.0**

MBA Concentrations

Business Analytics Concentration

The Business Analytics concentration prepares students to make good business decisions with fact-based analysis and an under stranding of business performance from a systems view, using statistical and quantitative analysis of data as well as explanatory and predictive modeling.

Requirements

STAT T680	Special Topics in STAT	0.5-9.0
Select two of the following:		6.0
ECON 650	Business & Economic Strategy: Game Theory & Applications	
FIN 642	Business Conditions and Forecasting	
MIS 630	Inter-Active Decision Support Systems	
OPR 601	Managerial Decision Models and Simulation	
OPR 626	System Simulation	
POM 625	Supply Chain Management	
STAT 628	Applied Regression Analysis	
STAT 634	Quality & Six-Sigma	
STAT 636	Experimental Design	
Total Credits		**6.5-15.0**

Healthcare Management Concentration

The concentration in Health Care management is a specialized, cohorted online program designed to address both the political and technological forces shaping the pharmaceutical and healthcare industry in competitive global markets. The program is designed for professionals in the pharmaceutical and healthcare industries to help achieve new understanding and potential for career advancement by integrating business strategy with science and technology and the unique perspective of the industry.

Requirements

BUSN 651	Healthcare Business Practice I: Foundations	3.0
BUSN 652	Healthcare Business Practice II	3.0
BUSN 653	Healthcare Business Practice III: Capstone	3.0
Total Credits		**9.0**

Finance Concentration

Required Courses		6.0
Select two of the following:		
FIN 602	Advanced Financial Management	
FIN 622	Financial Institutions & Markets	
FIN 624	Risk Management	
FIN 626	Investment Management	
FIN 635	Entrepreneurial Finance	
FIN 640	Mergers and Acquisitions	
FIN 642	Business Conditions and Forecasting	
FIN 648	International Financial Management	
FIN 790	Seminar in Finance	
Finance Electives		3.0
Select one of the following:		
BLAW 620	Legal Aspects of Employment	
BLAW T680	Special Topics in BLAW	
ECON 614	Macroeconomics	

ECON 630	International Economics
ECON 650	Business & Economic Strategy: Game Theory & Applications
INTB 632	Economic Analysis of Multinational Corporations
MGMT 655	Knowledge Management
MIS 624	E-Commerce Systems I
MIS 630	Inter-Active Decision Support Systems
MKTG 630	Global Marketing
MKTG 650	Marketing Management Cases and Problems
OPR 601	Managerial Decision Models and Simulation
POM 620	Management of Manufacturing Firms
POM 624	Management of Service Firms
STAT 634	Quality & Six-Sigma
Total Credits	**9.0**

Marketing Concentration

Required Courses		6.0
Select two of the following:		
MKTG 622	Buyer Behavior Theory	
MKTG 624	Channels of Distribution Management	
MKTG 630	Global Marketing	
MKTG 634	Integrated Marketing Communications Management	
MKTG 636	Business to Business Marketing	
MKTG 638	New Product Planning, Strategy, and Development	
MKTG 646	Services Marketing	
MKTG 650	Marketing Management Cases and Problems	
MKTG 652	Marketing Information Management and Research	
Electives		3.0
Select one of the following:		
BLAW T680	Special Topics in BLAW	
ECON 614	Macroeconomics	
ECON 630	International Economics	
FIN 642	Business Conditions and Forecasting	
FIN 648	International Financial Management	
INTB 632	Economic Analysis of Multinational Corporations	
INTB 790	Seminar in International Business	
MGMT 655	Knowledge Management	
MIS 624	E-Commerce Systems I	
MIS 630	Inter-Active Decision Support Systems	
MIS 632	Database Analysis and Design for Business	
OPR 601	Managerial Decision Models and Simulation	
POM 624	Management of Service Firms	
POM 625	Supply Chain Management	
STAT 634	Quality & Six-Sigma	
Total Credits		**9.0**

Entrepreneurship/Innovation Management Concentration

Required Courses		6.0
Select two of the following:		
BLAW 620	Legal Aspects of Employment	
BLAW 646	Legal Issues in New Ventures	
FIN 635	Entrepreneurial Finance	

MGMT 640	Strategic Human Resource Management
MGMT 655	Knowledge Management
MIS 624	E-Commerce Systems I
MIS 630	Inter-Active Decision Support Systems
MIS 632	Database Analysis and Design for Business
MKTG 638	New Product Planning, Strategy, and Development

Electives		3.0
Select one of the following:		
ECON 614	Macroeconomics	
ECON 630	International Economics	
ECON 650	Business & Economic Strategy: Game Theory & Applications	
FIN 602	Advanced Financial Management	
FIN 624	Risk Management	
FIN 640	Mergers and Acquisitions	
FIN 642	Business Conditions and Forecasting	
FIN 648	International Financial Management	
FIN 649	Comparative Financial Analysis	
INTB 632	Economic Analysis of Multinational Corporations	
INTB 790	Seminar in International Business	
MGMT 655	Knowledge Management	
MKTG 622	Buyer Behavior Theory	
MKTG 624	Channels of Distribution Management	
MKTG 630	Global Marketing	
MKTG 634	Integrated Marketing Communications Management	
MKTG 646	Services Marketing	
MKTG 650	Marketing Management Cases and Problems	
ORGB 640	Negotiations for Leaders	
OPR 601	Managerial Decision Models and Simulation	
POM 620	Management of Manufacturing Firms	
POM 624	Management of Service Firms	
POM 625	Supply Chain Management	
STAT 634	Quality & Six-Sigma	
Total Credits		**9.0**

BS/MBA students may be waived from two MBA Enterprise Management courses, assuming a grade of B or better is earned in specified undergraduate courses. Students can review the Waiver Policies for the Statement of Curriculum Standing (http://www.lebow.drexel.edu/PDF/Docs/Grad/CurriculumStanding.pdf) on the LeBow College's website for additional information.

Interdepartmental Faculty

Marco Airaudo, PhD *(University of Pennsylvania Philadelphia)*. Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.

Murugan Anandarajan, PhD *(Drexel University) Head of Department, Management*. Professor. Individual Internet usage behavior (specifically abuse and addiction); Application of artificial intelligence techniques in forensic accounting and ophthalmology.

Rolph E. Anderson, PhD *(University of Florida) Royal H. Gibson Sr. Professor of Marketing*. Professor. Personal selling and sales

management; multivariate data analysis; customer relationship management (CRM); customer satisfaction and customer loyalty.

Trina Larsen Andras, PhD *(University of Texas at Austin) Head of the Department of Marketing; Academic Director, Center for Corporate Research Management.* Professor. International marketing, marketing channels management, cross-cultural communication.

Orakwue B. Arinze, PhD *(London School of Economics).* Professor. Client/Server computing; Enterprise Application Software (EAS)/ Enterprise Resource Planning Software (ERP); knowledge-based and decision support applications in operations management.

Edward Arnheiter, PhD *(University of Massachusetts, Amherst) Department of Decision Sciences.* Clinical Professor. Quality implementation and management, supply chain, statistical quality control, six sigma.

Avijit Banerjee, PhD *(The Ohio State University) Department of Decision Sciences.* Professor. Supply chain management; operations planning and scheduling; inventory control.

David A. Becher, PhD *(Pennsylvania State University) Department of Finance.* Associate Professor. Mergers and acquisitions, corporate governance, financial institutions.

Hande Yurttan Benson, PhD *(Princeton University) Department of Decision Sciences.* Associate Professor. Nonlinear optimization, interior-point methods.

Jie Cai, PhD *(University of Iowa) Department of Finance.* Assistant Professor. Investment banking, mergers and acquisitions, corporate finance and corporate governance.

Oben Ceryan, PhD *(University of Michigan Ann Arbor) Department of Decision Sciences.* Assistant Professor. Pricing revenue management; inventory control; production planning and control supply chain management.

Hsihui Chang, PhD *(University of Minnesota) Department of Accounting and Tax, KPMG Endowed Chair and Department Head.* Professor.

Hiu Lam Choy, PhD *(University of Rochester).* Associate Professor. Financial accounting.

Roger D. Collons, JD, PhD *(George Washington University; Georgia State University) Department of Legal Studies.* Professor. Patent law, preservation of wealth.

Anthony P. Curatola, PhD *(Texas A&M University) Joseph F. Ford Professor of Accounting.* Professor. Federal and state income tax policy, retirement income taxation, fringe benefits taxation, educational savings and tax incentives, federal and state income tax research.

Mian Dai, PhD *(Northwestern University).* Assistant Professor. Managerial economics and strategy.

Qizhi Dai, PhD *(University of Minnesota).* Associate Professor. Business to Business E-Commerce; information technology adoption; economic analysis of information systems.

Naveen Daniel, PhD *(Arizona State University).* Assistant Professor. Corporate governance, mutual funds, hedge funds.

Patricia L. Daniel Derrick, PhD *(The George Washington University).* Assistant Clinical Professor.

Donna Marie De Carolis, PhD *(Temple University) Dean, Close School of Entrepreneurship.* Professor. Pharmaceutical/biotechnology industries; entrepreneurship; technology & strategy; technology commercialization, strategic alliances; social capital.

Neil Desnoyers, MS *(Drexel University) Department of Decision Sciences.* Assistant Clinical Professor. Decision sciences.

Daniel Dorn, PhD *(Columbia University) Department of Finance.* Associate Professor. Capital markets and investments; behavioral finance.

Casey Dougal, PhD *(University of North Carolina, Chapel Hill).* Assistant Professor. Empirical asset pricing, financial media, behavioral finance, and urban economics.

Michaela Draganska, PhD *(Kellog School of Management, Northwestern University).* Associate Professor. Advertising strategy, product assortment decisions, new product positioning, distribution channels.

Anne Duchene, PhD *(Ecole Nationale des Ponts et Chaussees, France) Department of Economics and International Business.* Assistant Professor. Microeconomics, industrial organization, law and economics.

Larry Duke, MBA *(Harvard Business School).* Associate Clinical Professor. International marketing and strategy, new product development, business-to-business marketing, marketing of financial services.

Eliezer M. Fich, PhD *(New York University) Department of Finance.* Associate Professor. Empirical topics in corporate finance.

Richard P. Freedman, JD, LLM *(Temple University) Head of the Department of Legal Studies.* Associate Professor. Taxation, corporate and business matters, real estate, estate planning, estate administration and elder law.

David Gefen, PhD *(Georgia State University).* Professor. Strategic IT management; IT development and implementation management; research methodology; managing the adoption of large IT systems, such as MRP II, ERP, and expert systems; research methodology.

Azi Gera, PhD *(University of Maryland).* Assistant Professor. Business planning, new venture performance and survival, social networking, cognition and strategy, determinants of firm performance, attention based view, business angles and VC firms, interfirm signaling, private equity investments.

Hubert Glover, PhD *(Texas A&M University) Department of Accounting and Tax.* Associate Clinical Professor. International financial reporting.

Michael Joseph Gombola, PhD *(University of South Carolina) Head of the Department of Finance.* Professor. Stock offerings and repurchases, mergers, acquisitions, and restructuring; working capital management, time series analysis; options and derivatives, financial statement analysis.

Cuneyt Gozu, PhD *(University of Albany).* Associate Clinical Professor.

Jeffrey H. Greenhaus, PhD *(New York University) William A. Mackie Professor of Management.* Professor. Career management, career decision making, work-family linkages, managing diversity,career and adult life development, organizational behavior/human resources, job

design, models of work motivation and job attitudes, human resource staffing.

Barbara Murray Grein, PhD *(Kenan-Flagler Business School, University of North Carolina) Department of Accounting and Tax*. Associate Professor. Auditing, auditor selection, audit adjustments, audit fees, corporate governance, financial reporting.

Curtis M. Hall, MBA *(University of Arizona)*. Assistant Professor. Strategic cost management; corporate governance; capital markets research in accounting; human capital investment.

Shawkat M. Hammoudeh, PhD *(University of Kansas) Department of Economics and International Business*. Professor. Applied econometrics, financial economics, international economics, natural resource economics.

Teresa D. Harrison, PhD *(University of Texas at Austin) Department of Economics and International Business*. Associate Professor. Econometrics, public finance, industrial organization, empirical microeconomics including health and nonprofit organizations.

Yanliu Huang, PhD *(The Wharton School, University of Pennsylvania)*. Assistant Professor. Consumer n-store decision making, consumer planning, health marketing, memory and learning.

Mazhar Islam, PhD *(University of Minnesota)*. Assistant Professor. New markets in emerging countries, alliances, corporate entrepreneurship, emerging countries, pharmaceutical and biotechnology industry, technological innovation, transaction cost economics.

Paul E. Jensen, PhD *(Penn State University) Associate Dean, College of Business*. Associate Professor. International trade. Primary research interest is international trade, particularly in empirical studies of international trade patterns.

Bang Nam Jeon, PhD *(Indiana University) Department of Economics and International Business*. Professor. Financial economics, world financial market linkages, foreign direct investment flows in the Asia-Pacific economies, the Korean economy: currency crisis, FDI, and macroeconomic issues, regional economic integration and newly industrializing economies: the

Kevin K. Jones, EDB *(Georgia State University)*. Assistant Clinical Professor.

Stephen Joyce, MA *(Temple University) Department of Economics and International Business*. Assistant Clinical Professor. Education and human capital.

Robert W. Keidel, PhD *(Wharton School, University of Pennsylvania)*. Clinical Professor. Organization design and change, management of technology, strategic cognition.

Natalya V. Khimich, PhD *(University of Califormia at Berkeley)*. Assistant Professor. Equity valuation, earnings quality, and accounting for innovation and intangible assets.

Seung-Lae Kim, PhD *(Penn State University) Department of Decision Sciences*. Professor. Production planning and control; inventory control; Just-In-Time (JIT) and Supply Chain Management (SCM).

Stacy Kline, MBA *(Temple University) Department of Accounting and Tax*. Clinical Professor. Individual, corporation; S corporation and partnership taxation.

Daniel Korshun, PhD *(Boston University)*. Assistant Professor. Brand and corporate reputation management, corporate social responsibility, internal marketing, marketing strategy, relationship marketing.

Edward C. Koziara, PhD *(University of Wisconsin) Department of Economics and International Business*. Professor Emeritus. Applied micro and macro economics.

Amy Laura Kratchman, MBA *(Drexel University) Department of Finance*. Clinical Associate Professor. Portfolio management, specifically related to fixed income securities; investment management for pension and mutual fund companies, and fixed income securities.

Rosalie S. Kreider, JD *(Villanova University) Department of Legal Studies*. Clinical Professor. Business law, international business law.

Hyokjin Kwak, PhD *(University of Georgia) Department of Marketing*. Associate Professor. Advertising effects, consumer behaviors and e-commerce.

Robert E. Laessig, PhD *(Cornell University) Department of Decision Sciences*. Professor Emeritus. Management systems integration.

Christopher A. Laincz, PhD *(Duke University) Department of Economics and International Business*. Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Bijou Yang Lester, PhD *(University of Pennsylvania) Department of Economics and International Business*. Professor. Behavioral characteristics of shopping on-line, economic issues of electronic commerce, contingent employment and part-time work, the economy and suicide.

Benjamin Lev, PhD *(Case Western Reserve University) Department Head, Department of Decision Sciences*. Professor. Operations research/management science, statistics, applications, engineering management.

Merrill W. Liechty, PhD *(Duke University) Department of Decision Sciences*. Associate Clinical Professor. Bayesian statistics, portfolio selection, higher moment estimation.

Keisha Liggett-Nichols, EDB *(Georgia State University)*. Associate Clinical Professor. Corporate entrepreneurship, determinants of firm performance, evidence-based management.

Frank Linnehan, PhD *(Temple University) Interim Dean, LeBow College of Business*. Professor. Affirmative action; workforce diversity; equal employment; school-to-work transitions for younger workers. Research focuses on issues of race and diversity in the workplace.

Yu-Chieh Lo, PhD *(University of Southern California)*. Assistant Professor. Organization theory, technology entrepreneurship.

Mark Loschiavo, MS *(University of Kentucky)*. Clinical Professor. Business planning; new venture performance and survival; strategic management; strategic thinking; technology entrepreneurship.

Dali Ma, PhD *(University of Chicago)*. Assistant Professor. Status dynamics, social networks, founding team formation; venture capital syndication; family business; Chinese private entrepreneurship.

Vibhas Madan, PhD *(Michigan State University) Head of the Department of Economics and International Business*. Professor. International trade theory, applied microeconomics.

Arunkumar Madapusi, PhD *(University of North Texas Denton) Department of Decision Sciences.* Assistant Clinical Professor. Manufacturing technology development; quality management; supply chain management; interface with information systems.

Hazem Diab Maragah, PhD *(Louisiana University) Department of Decision Sciences.* Associate Professor. Statistical quality control, total equity management, applied statistics.

Michele K. Masterfano, DBA *(Argosy University of Sarasolta).* Associate Clinical Professor. Entrepreneurship/small business administration, business planning, social capital, social networking.

Mary Mawritz, PhD *(University of Central Florida).* Assistant Professor. Abusive supervision; deviant behavior; leadership.

Roger A. McCain, PhD *(Louisiana State University) Department of Economics and International Business.* Professor. Computational economics, game theory.

Bruce D. McCullough, PhD *(University of Texas) Department of Decision Sciences.* Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Thomas P. McWilliams, PhD *(Stanford University) Department of Decision Sciences.* Professor. Statistical quality control; sequential analysis.

Irina Murtazashvili, PhD *(Michigan state University).* Assistant Professor. Applied econometrics.

Suchet Nadkarni, PhD *(University of Kansas).* Associate Professor. Strategic management, cognition and strategy.

V. K. Narayanan, PhD *(University of Pittsburgh) Delloitte Touche Jones Stubbs Professor; Associate Dean of Research, Department of Management.* Corporate and business strategy; management of technology and innovation; strategy implementation; macro environmental analysis; knowledge management; competitor analysis and intelligence.

Gordon Ndubizu, PhD *(Temple University) Department of Accounting and Tax.* Professor. Financial accounting.

Edward Nelling, PhD, CFA *(University of Pennsylvania-Wharton) Department of Finance.* Associate Professor. Investments; corporate finance; real estate finance.

Gregory Nini, PhD *(The Wharton School, University of Pennsylvania).* Assistant Professor. Creditor control rights, corporate governance, and firm value; insurance economics.

Maria Olivero, PhD *(Duke University) Department of Economics and International Business.* Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA *(American University) Department of Economics and International Business.* Clinical Associate Professor. Macroeconomics, political economy.

Neal Orkin, JD *(Temple University) Department of Legal Studies.* Associate Professor. Intellectual property rights of employed inventors and authors; labor relations.

Duri Park, MS (PhD expected in 2013) *(Ohio State University).* Assistant Professor. Financial accounting, insider trading, investments, and cash holdings.

Haemin Park, PhD *(University of Washington).* Assistant Professor. Corporate entrepreneurship; IPO; knowledge-based view of the firm; new venture performance and survival; technology entrepreneurship; venture capital.

Fariborz Y. Partovi, Ph.D. *(The Wharton School, University of Pennsylvania) Department of Decision Sciences.* Professor. The use of analytical hierarchy process and quality function deployment for strategic decisions in manufacturing and service organizations.

Pedersen Pedersen, JD *(Harvard University) Department of Legal Studies.* Assistant Professor. American law, contract law, labor and employment law.

Bernhard Reichert, PhD, CPA *(University of Texas at Austin) Department of Accounting and Tax.* Assistant Professor. Behavioral research in accounting and experimental economics.

Christian Resick, PhD *(Wayne State University).* Associate Professor. Linkages between CEO personality with organizational culture, climate, and effectiveness; cross-cultural studies of ethical leadership beliefs and behaviors; roles of team leadership and member personality in building shared cognition and effective teamwo

Stanley Ridgley, PhD *(Duke University).* Assistant Clinical Professor. Business communication; cognition and strategy; competitive intelligence; determinants of firm performance; new markets in emerging countries; Russian business culture.

Patricia Robak, PhD *(Lehigh University) Department of Finance.* Clinical Associate Professor. Investments, money and banking, international finance.

Bert Rosenbloom, PhD *(Temple University) Rauth Chair of Electronic Commerce.* Professor. Marketing channels and distribution systems, electronic commerce, interorganizational marketing management, wholesale and retail distribution, marketing strategy and planning.

Raja Roy, PhD *(University of Pittsburgh).* Assistant Professor. Technology entrepreneurship, determinants of firm performance, technological change, technological innovation.

Diana Sandberg, MS *(Drexel University) Department of Finance.* Clinical Associate Professor. Portfolio management, derivatives, investment management.

Konstantinos Serfes, PhD *(University of Illinois at Champaign-Urbana) Department of Economics and International Business.* Associate Professor. Industrial organization; microeconomics.

Samir Shah, DPS *(Pace University).* Associate Clinical Professor.

Wenjing Shen, PhD *(University of Michigan) Department of Decision Sciences.* Assistant Professor. The interface of operations management and marketing; inventory management; supply chain management.

Steven R. Sher, JD *(Georgetown University Law Center) Department of Legal Studies.* Associate Professor. Business law, product liability, negligence, medical malpractice.

Milton Silver, PhD *(Columbia University).* Professor Emeritus. Strategic planning and control systems, analysis and design of information systems, and executive and management development and training.

Prashant Srivastava, PhD *(Oklahoma State University).* Associate Clinical Professor. New product development, supply chain management, B2B

marketing, sales, strategic alliances, organizational learning, market orientation, healthcare marketing, and database marketing.

Mark Stehr, PhD *(University of California at Berkeley) Department of Economics and International Business.* Associate Professor. Health Economics, public finance, public policy.

Rajneesh Suri, PhD *(University of Illinois at Urbana-Champaign).* Professor. Pricing, promotions and branding.

Srinivasan Swaminathan, PhD *(University of Texas-Austin).* Professor. Marketing research and strategy, pricing and promotions, loyalty and satisfaction.

Constantinos Syropoulos, PhD *(Yale University) Trustee Professor of International Economics, Department of Economics and International Business.* Professor. International trade, political economy, applied microeconomics.

Samuel H. Szewczyk, PhD *(Pennsylvania State University) Department of Finance.* Associate Professor. Corporate governance, mergers and acquisitions, financial engineering, investment banking, financial institutions.

An Tran, PhD *(University of Colorado--Boulder).* Assistant Clinical Professor. Intertemporal choice, the psychology of time and money, consumer planning, financial decision making.

George Tsetsekos, PhD *(The University of Tennessee) Dean, LeBow College of Business.* Professor. Valuation and corporate restructuring, treasury and risk/hedging operations, investment banking, securitization, emerging capital markets, multinational finance, bank asset-liability management.

Daniel Tzabbar, PhD *(University of Toronto).* Assistant Professor. Business planning, social capital, technology entrepreneurship, alliances, human capital, innovation management, strategic management.

Mark Vargus, PhD *(Wharton School, University of Pennsylvania) Department of Accounting and Tax.* Assistant Professor. Capital market research and executive compensation.

Andrew G. Verzilli, PhD *(Boston College).* Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Ralph Walkling, PhD *(University of Maryland) Stratakis Professor of Corporate Governance, Department of Finance.* Professor. Corporate governance, mergers and acquisitions.

Min Wang, PhD *(Columbia University) Department of Decision Sciences.* Assistant Professor.

Matthew Weinberg, PhD *(Princeton University).* Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Joan Weiner, PhD *(The Wharton School, University of Pennsylvania).* Professor. Business ethics, leadership, communication and decision making; educational innovation; health system management design.

Jennifer Wright, MTA Master of Tax Accounting *(Villanova University) Department of Accounting and Tax.* Associate Clinical Professor.

Chiou-shuang Yan, PhD *(Purdue University).* Professor Emeritus. International economics, input-output analysis.

Yoto Yotov, PhD *(Boston College).* Associate Professor. International trade, applied microeconomics, political economy.

Jonathan C. Ziegert, PhD *(University of Maryland).* Associate Professor. Leadership; team dynamics; group performance; attraction and recruitment; discrimination.

Accounting

Major: Accounting
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0 quarter credits (for students entering with an undergraduate degree in accounting); 63.0 quarter credits (for students entering without an undergraduate degree in accounting)
Classification of Instructional Programs (CIP) code: 52.0301
Standard Occupational Classification (SOC) code: 13-2011

About the Program

The MS in Accounting program, which can be completed in a one-year or two-year format, is designed to meet the needs of those who plan careers in public accounting, corporate accounting, not-for-profit accounting, or government accounting.

The one-year (45.0 quarter credit) option is for students already awarded an undergraduate degree in accounting. Students who do not have an undergraduate degree in accounting can be considered for admission to the two-year (63.0 quarter credit) program, where prerequisite courses are completed in the first year of study.

The program offers students the opportunity to obtain the technical knowledge, analytical skills and communication proficiency required to serve as ethical and effective accounting professionals. Upon completion of the program, students will be qualified to sit for the Certified Public Accountant (CPA) examination.

The one-year program builds on knowledge equivalent to the requirements for a Drexel University baccalaureate degree in business with a major in accounting. Applicants must have earned a minimum grade of C in each of the following prerequisite courses:

Prerequisite Requirements

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
ACCT 321	Financial Reporting I	4.0
ACCT 322	Financial Reporting II	4.0
ACCT 323	Financial Reporting III	4.0
ACCT 331	Cost Accounting	4.0
ACCT 341	Principles of Auditing	4.0
TAX 341	Individual Income Taxes	4.0

The one-year program is restricted to students who have completed an undergraduate accounting degree at Drexel University or those who have had the requisite accounting courses completed at any AACSB accredited business school. Appropriate syllabi to support transcripts must be submitted for admission consideration.

For Drexel University students planning on entering the one-year program, they are expected to be at Drexel for five years (4 undergraduate years + 1 year for the MS degree) with one co-op residency as part of their combined BS/MS program. Further, while

students with undergraduate degrees in accounting from non-US schools may be eligible for admission to the program, completion of the program will not necessarily make them eligible to sit for the CPA examination. These students will be responsible for assessing whether their academic backgrounds make them eligible to sit for the CPA examination.

Students with undergraduate degrees in areas outside of accounting can be considered for admission to the two-year program or to the one-year program only after they acquire the necessary prerequisite undergraduate accounting and/or business courses. These students should contact the LeBow Advising Office (http://www.lebow.drexel.edu/Current/Undergraduate/advising.php) to determine what courses are needed to gain admission to the MS in Accounting program.

State CPA Requirements

Under the accountancy law that became effective in Pennsylvania in 2012, an individual interested in practicing as a CPA is required to have the equivalent of 150.0 semester (225.0 quarter) credit hours of university education and 36.0 semester-credits (54.0 quarter-credits) in accounting subjects. The combined BS/MS in Accounting program satisfies this Pennsylvania state certification requirement. If students are interested in taking the CPA examination in another state (e.g., Delaware, New Jersey, Maryland), they will need to work in conjunction with the relevant State Board of Accountancy, the Accounting Department, and the LeBow Advising Office to ensure their eligibility to sit for the CPA examination in their desired state.

Students should contact the Accounting Department (http://www.lebow.drexel.edu/Faculty/Departments/Accounting) for additional information.

One-Year Program: Degree Requirements

Required Core Courses

ACCT 600	Accounting Analysis & Theory	3.0
ACCT 603	Strategic Cost Management	3.0
ACCT 604	International Financial Reporting	3.0
ACCT 605	Assurance Services	3.0
ACCT 606	Current Issues in the Accounting Profession	3.0
ACCT 622	Advanced Financial Accounting	3.0
BLAW 626	Law for the CPA Exam	3.0
TAX 630	Corporate Taxation	3.0
Select two of the following:		6.0
ACCT 607	Forensic Investigation	
ACCT 608	Government and Not-for-Profit Accounting	
ACCT 628	Accounting Valuation Issues	
ACCT 644	Internal Auditing	
ACCT 650	Accounting Information Systems	
FIN 602	Advanced Financial Management	
FIN 610	Corporate Governance	
FIN 624	Risk Management	
MIS 612	Aligning Information Systems and Business Strategies	
MIS 630	Inter-Active Decision Support Systems	
MIS 662	Managing with Enterprise Application Software using SAP-Accounting & Analytics	
ORGB 631	Leading Effective Organizations	
ORGB 640	Negotiations for Leaders	

TAX 611	Tax Research	
TAX T680	Special Topics in TAX	
Business Elective Courses		**15.0**

Students take any five (5) business courses from within the Lebow College of Business. Students should consult with their program manager for the full list of approved electives available each term.

Total Credits	**45.0**

Students should contact the Accounting Department (http://www.lebow.drexel.edu/Faculty/Departments/Accounting) for additional information.

Two-Year Program: Degree Requirements

Required Courses

ACCT 600	Accounting Analysis & Theory	3.0
ACCT 601	Managerial Accounting	3.0
ACCT 603	Strategic Cost Management	3.0
ACCT 604	International Financial Reporting	3.0
ACCT 605	Assurance Services	3.0
ACCT 606	Current Issues in the Accounting Profession	3.0
ACCT 622	Advanced Financial Accounting	3.0
ACCT 625	Financial Accounting Theory I	3.0
ACCT 626	Financial Accounting Theory II	3.0
ACCT 627	Financial Accounting Theory III	3.0
ACCT 631	Cost Accounting	3.0
ACCT 640	Auditing Theory and Philosophy	3.0
BLAW 626	Law for the CPA Exam	3.0
ECON 601	Managerial Economics	3.0
FIN 601	Corporate Financial Management	3.0
STAT 601	Business Statistics	3.0
TAX 620	Individual Taxation	3.0
TAX 630	Corporate Taxation	3.0
Electives		**9.0**

Students select an additional three elective courses. At least two courses must be ACCT or TAX. The following is a list of suggested electives. Students should consult with their program manager for the full list of approved electives available each term.

ACCT 607	Forensic Investigation	
ACCT 608	Government and Not-for-Profit Accounting	
ACCT 628	Accounting Valuation Issues	
ACCT 644	Internal Auditing	
ACCT 650	Accounting Information Systems	
FIN 602	Advanced Financial Management	
FIN 610	Corporate Governance	
FIN 624	Risk Management	
MIS 612	Aligning Information Systems and Business Strategies	
MIS 630	Inter-Active Decision Support Systems	
MIS 662	Managing with Enterprise Application Software using SAP-Accounting & Analytics	
ORGB 631	Leading Effective Organizations	
ORGB 640	Negotiations for Leaders	
TAX 611	Tax Research	

TAX T680	Special Topics in TAX	
Total Credits		**63.0**

Accounting and Tax Faculty

Hsihui Chang, PhD *(University of Minnesota) Department of Accounting and Tax, KPMG Endowed Chair and Department Head*. Professor.

Hiu Lam Choy, PhD *(University of Rochester)*. Associate Professor. Financial accounting.

Anthony P. Curatola, PhD *(Texas A&M University) Joseph F. Ford Professor of Accounting*. Professor. Federal and state income tax policy, retirement income taxation, fringe benefits taxation, educational savings and tax incentives, federal and state income tax research.

Patricia L. Daniel Derrick, PhD *(The George Washington University)*. Assistant Clinical Professor.

Hubert Glover, PhD *(Texas A&M University) Department of Accounting and Tax*. Associate Clinical Professor. International financial reporting.

Barbara Murray Grein, PhD *(Kenan-Flagler Business School, University of North Carolina) Department of Accounting and Tax*. Associate Professor. Auditing, auditor selection, audit adjustments, audit fees, corporate governance, financial reporting.

Curtis M. Hall, MBA *(University of Arizona)*. Assistant Professor. Strategic cost management; corporate governance; capital markets research in accounting; human capital investment.

Kevin K. Jones, EDB *(Georgia State University)*. Assistant Clinical Professor.

Natalya V. Khimich, PhD *(University of Califormia at Berkeley)*. Assistant Professor. Equity valuation, earnings quality, and accounting for innovation and intangible assets.

Stacy Kline, MBA *(Temple University) Department of Accounting and Tax*. Clinical Professor. Individual, corporation; S corporation and partnership taxation.

Gordon Ndubizu, PhD *(Temple University) Department of Accounting and Tax*. Professor. Financial accounting.

Duri Park, MS (PhD expected in 2013) *(Ohio State University)*. Assistant Professor. Financial accounting, insider trading, investments, and cash holdings.

Bernhard Reichert, PhD, CPA *(University of Texas at Austin) Department of Accounting and Tax*. Assistant Professor. Behavioral research in accounting and experimental economics.

Mark Vargus, PhD *(Wharton School, University of Pennsylvania) Department of Accounting and Tax*. Assistant Professor. Capital market research and executive compensation.

Jennifer Wright, MTA Master of Tax Accounting *(Villanova University) Department of Accounting and Tax*. Associate Clinical Professor.

Business Analytics

Major: Business Analytics
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter

Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.1301
Standard Occupational Classification (SOC) code: 11-1021

About the Program

The MS in Business Analytics program is designed for students who have an interest in quantitative methods, data analysis, and using computer programs to solve business problems.

Students learn how to access and analyze data for the purpose of improved business decision-making. This program prepares students to make good business decisions with fact-based insights and an understanding of business performance from a systems view, using statistical and quantitative analysis of data as well as explanatory and predictive modeling.

The program draws upon three traditional areas of business intelligence:

- *statistics*, to explore and uncover relationships in data;
- *operations research*, to develop mathematical models for data-supported decision making; and
- *management information systems*, to access and create databases that support the other two areas.

Additional Information

For additional information about the program, students should contact the Department of Decision Sciences and MIS (http://www.lebow.drexel.edu/Faculty/Departments/Decision).

Degree Requirements

Operations Research

OPR 601	Managerial Decision Models and Simulation	3.0
OPR 620	Operations Research I	3.0
Statistics		
STAT 610	Statistics for Business Analytics	3.0
STAT 630	Multivariate Analysis	3.0
STAT 642	Data Mining for Business Analytics	3.0
Management Information Systems		
MIS 612	Aligning Information Systems and Business Strategies	3.0
MIS 633	Predictive Business Analytics with Relational Database Data	3.0
MIS 634	Advanced Business Analytics with Relational Database Data	3.0
Capstone Project		
BUSN 710	Business Analytics Capstone Project	3.0
Students Select One Concentration**		9.0
Information Systems Concentration		
Select three of the following		
MIS 624	E-Commerce Systems I	
MIS 630	Inter-Active Decision Support Systems	
MIS 631	VB.NET Programming	
MIS 632	Database Analysis and Design for Business	
MIS 641	MIS Policy and Strategy	
MIS 650	Management of Health Care Info Systems	

MIS 651	Information Systems Outsourcing Management
MIS 661	Managing with Enterprise Application Software using SAP - Logistics
MIS 662	Managing with Enterprise Application Software using SAP-Accounting & Analytics

Statistics Concentration

Select Three of the Following

STAT 626	Statistical Sampling
STAT 628	Applied Regression Analysis
STAT 634	Quality & Six-Sigma
STAT 636	Experimental Design
STAT 638	Advanced Statistical Quality Control
ECON 550	Econometrics
ECON 560	Time Series Econometrics
ECON 639	Applied Industrial Analysis
FIN 642	Business Conditions and Forecasting
MKTG 606	Customer Analytics

Modeling Concentration

Select Three of the Following

OPR 622	Operations Research II
OPR 624	Advanced Mathematical Program
OPR 626	System Simulation
OPR 640	Decision Models for the Public Sector
ECON 548	Mathematical Economics
ECON 610	Microeconomics
ECON 650	Business & Economic Strategy: Game Theory & Applications

Functional Area of Business Concentration

To complete a concentration in one of these fields, the student will develop a plan of study that is mutually approved by the student and the Department Head.

Select three 600-level courses from either: ACCT, FIN, MKTG, POM or ECON

Free Electives**	9.0
Select three 600-level courses within LeBow.	

Total Credits	**45.0**

*   Students will need to have the prerequisite for this course waived with permission of the instructor.

**   Courses outside LeBow can be substituted with permission from Department Head and/or Associate Dean.

Decision Sciences Faculty

Edward Arnheiter, PhD *(University of Massachusetts, Amherst) Department of Decision Sciences.* Clinical Professor. Quality implementation and management, supply chain, statistical quality control, six sigma.

Avijit Banerjee, PhD *(The Ohio State University) Department of Decision Sciences.* Professor. Supply chain management; operations planning and scheduling; inventory control.

Hande Yurttan Benson, PhD *(Princeton University) Department of Decision Sciences.* Associate Professor. Nonlinear optimization, interior-point methods.

Oben Ceryan, PhD *(University of Michigan Ann Arbor) Department of Decision Sciences.* Assistant Professor. Pricing revenue management; inventory control; production planning and control supply chain management.

Neil Desnoyers, MS *(Drexel University) Department of Decision Sciences.* Assistant Clinical Professor. Decision sciences.

Seung-Lae Kim, PhD *(Penn State University) Department of Decision Sciences.* Professor. Production planning and control; inventory control; Just-In-Time (JIT) and Supply Chain Management (SCM).

Benjamin Lev, PhD *(Case Western Reserve University) Department Head, Department of Decision Sciences.* Professor. Operations research/management science, statistics, applications, engineering management.

Merrill W. Liechty, PhD *(Duke University) Department of Decision Sciences.* Associate Clinical Professor. Bayesian statistics, portfolio selection, higher moment estimation.

Arunkumar Madapusi, PhD *(University of North Texas Denton) Department of Decision Sciences.* Assistant Clinical Professor. Manufacturing technology development; quality management; supply chain management; interface with information systems.

Hazem Diab Maragah, PhD *(Louisiana University) Department of Decision Sciences.* Associate Professor. Statistical quality control, total equity management, applied statistics.

Bruce D. McCullough, PhD *(University of Texas) Department of Decision Sciences.* Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Thomas P. McWilliams, PhD *(Stanford University) Department of Decision Sciences.* Professor. Statistical quality control; sequential analysis.

Fariborz Y. Partovi, Ph.D. *(The Wharton School, University of Pennsylvania) Department of Decision Sciences.* Professor. The use of analytical hierarchy process and quality function deployment for strategic decisions in manufacturing and service organizations.

Wenjing Shen, PhD *(University of Michigan) Department of Decision Sciences.* Assistant Professor. The interface of operations management and marketing; inventory management; supply chain management.

Min Wang, PhD *(Columbia University) Department of Decision Sciences.* Assistant Professor.

Emeritus Faculty

Robert E. Laessig, PhD *(Cornell University) Department of Decision Sciences.* Professor Emeritus. Management systems integration.

Finance

Major: Finance
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 54.0
Classification of Instructional Programs (CIP) code: 52.0801
Standard Occupational Classification (SOC) code: 11-3031; 13-2031; 13-2041; 13-2051

About the Program

The MS in Finance program is designed to meet the needs of individuals who plan specialized careers in finance or financial consulting in business or industrial firms, investment management and advisory firms, consulting firms, public accounting firms, or banking and financial institutions.

The program has a more focused curriculum than the MBA, allowing students to expand their understanding of finance for advancement in the field. The program is for those interested in establishing a career in finance or financial services, seeking career advancement or making a career change to the field. Many students ultimately seek to achieve the Chartered Financial Analyst (CFA) designation.

- Like the MBA program, the MS in Finance program can include an internship or consulting experience with an employer in the finance field.
- Due to course sequencing, students enrolling in the MS in Finance program begin in the fall quarter.

Admission Requirements

The following items are required for admissions consideration:

- GMAT score
- Official transcripts from all colleges/universities attended
- Two letters of recommendation
- Personal statement
- Resume
- TOEFL score (for international students)

The admission committee will evaluate your candidacy based on test scores and undergraduate GPA, with some consideration given for work experience. Work experience is preferred and will enhance the composite admission score, but is not mandatory. There is no specific minimum score requirement for GMAT and/or TOEFL as admission is based on a composite score. However, the average GMAT for current graduate students is approximately 600 and TOEFL scores usually exceeds 90.

Please contact Drexel LeBow's Graduate Admissions Office directly with any questions concerning required entrance exams (such as the GMAT), evaluation of undergraduate or graduate records (grades, scores, total years and subjects studied, etc.), and any other issues regarding application to the College's MS in Finance program (http://www.lebow.drexel.edu/resources/admissions/mbams/admissions-standards).

Degree Requirements

Foundation Courses

BUSN 501	Measuring and Maximizing Financial Performance	3.0
BUSN 502	Essentials of Economics	3.0
Required Core Courses		
STAT 610	Statistics for Business Analytics	3.0
ECON 601	Managerial Economics	3.0
ACCT 601	Managerial Accounting	3.0
OPR 601	Managerial Decision Models and Simulation	3.0
Required Finance Courses		
FIN 601	Corporate Financial Management	3.0
FIN 602	Advanced Financial Management	3.0
FIN 622	Financial Institutions & Markets	3.0

FIN 626	Investment Management	3.0
FIN 642	Business Conditions and Forecasting	3.0
FIN 790	Seminar in Finance	3.0
or FIN 794	Seminar in Investments	
Elective Graduate Courses [*]		
Select six of the following:		18.0
ECON 614	Macroeconomics	
ECON 630	International Economics	
FIN 624	Risk Management	
FIN 635	Entrepreneurial Finance	
FIN 640	Mergers and Acquisitions	
FIN 648	International Financial Management	
FIN 649	Comparative Financial Analysis	
FIN 650	Derivative Securities	
POM 601	Operations Management	
STAT 622	Statistical Decision Theory I	
STAT 628	Applied Regression Analysis	
TAX 620	Individual Taxation	
TAX 630	Corporate Taxation	
TAX 790	Tax Policy Seminar	
BUSN 698	Course BUSN 698 Not Found	
Total Credits		**54.0**

[*] At least three electives must be finance courses. Courses other than those listed are acceptable with approval of the Finance Department Head or the MS Finance Advisor.
Additional specialization can be achieved by concentrating the six electives in one of the following fields: banking, investments, or systems management.

Finance Faculty

David A. Becher, PhD *(Pennsylvania State University) Department of Finance.* Associate Professor. Mergers and acquisitions, corporate governance, financial institutions.

Erik Benrud, PhD, FRM, CAIA, CFA *(University of Virginia) Department of Finance.* Clinical Professor. Economics/managerial economics: game theory; finance: alternative investments, derivatives.

Jie Cai, PhD *(University of Iowa) Department of Finance.* Assistant Professor. Investment banking, mergers and acquisitions, corporate finance and corporate governance.

Thomas Chi-Nan Chiang, PhD *(The Pennsylvania State University) Marshall M. Austin Professor of Finance.* Professor. International finance; time series analysis of financial data; econometric modeling & forecasting; financial markets; international risk management; monetary theory; macroeconomics; emerging markets; and global country funds.

Naveen Daniel, PhD *(Arizona State University).* Assistant Professor. Corporate governance, mutual funds, hedge funds.

Daniel Dorn, PhD *(Columbia University) Department of Finance.* Associate Professor. Capital markets and investments; behavioral finance.

Casey Dougal, PhD *(University of North Carolina, Chapel Hill).* Assistant Professor. Empirical asset pricing, financial media, behavioral finance, and urban economics.

Eliezer M. Fich, PhD *(New York University) Department of Finance.* Associate Professor. Empirical topics in corporate finance.

Michael Joseph Gombola, PhD *(University of South Carolina) Head of the Department of Finance.* Professor. Stock offerings and repurchases, mergers, acquisitions, and restructuring; working capital management, time series analysis; options and derivatives, financial statement analysis.

Amy Laura Kratchman, MBA *(Drexel University) Department of Finance.* Clinical Associate Professor. Portfolio management, specifically related to fixed income securities; investment management for pension and mutual fund companies, and fixed income securities.

Edward Nelling, PhD, CFA *(University of Pennsylvania-Wharton) Department of Finance.* Associate Professor. Investments; corporate finance; real estate finance.

Gregory Nini, PhD *(The Wharton School, University of Pennsylvania).* Assistant Professor. Creditor control rights, corporate governance, and firm value; insurance economics.

Patricia Robak, PhD *(Lehigh University) Department of Finance.* Clinical Associate Professor. Investments, money and banking, international finance.

Diana Sandberg, MS *(Drexel University) Department of Finance.* Clinical Associate Professor. Portfolio management, derivatives, investment management.

Samuel H. Szewczyk, PhD *(Pennsylvania State University) Department of Finance.* Associate Professor. Corporate governance, mergers and acquisitions, financial engineering, investment banking, financial institutions.

George Tsetsekos, PhD *(The University of Tennessee) Dean, LeBow College of Business.* Professor. Valuation and corporate restructuring, treasury and risk/hedging operations, investment banking, securitization, emerging capital markets, multinational finance, bank asset-liability management.

Ralph Walkling, PhD *(University of Maryland) Stratakis Professor of Corporate Governance, Department of Finance.* Professor. Corporate governance, mergers and acquisitions.

Leadership

Major: Leadership
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.0213
Standard Occupational Classification (SOC) code: 13-1111

About the Program

The MS in Leadership program will be launching in fall of 2014. The program is designed for individuals interested in examining the roles of the individual and business in society. Using a multi-disciplinary approach, students learn to help shape the strategic direction of an organization within its environment. The program combines foundational and core coursework in general business with economics, legal studies, leadership

and management to expand a student's ability to aid in long-term planning for business and industry.

Students interested in the program are from diverse backgrounds and industries looking for advancement in their specialization, and need a sound business background to take the next step. This program builds a foundation of general business knowledge while providing tools for examining individual and company roles within society and for strategic planning within their organization.

Program Delivery

- The MS in Leadership is a lockstep program delivered through a blend of face-to-face classes at Drexel University's Malvern, PA campus and through online courses.
- Many of the courses in the MS in Leadership program will be completed with students enrolled in the College's MBA programs.
- New cohorts begin each winter quarter

Curriculum

The curriculum consists of a (1) six-credit foundation in accounting, finance and economics; (2) core coursework in business law, economics, leadership and marketing; (3) a two-course sequence in leadership, legal studies, management and economics. The highlight of the program is a series of capstone courses in sustainability and a project-based course that demonstrates the student's integrated knowledge obtained through the program.

Areas of learning objectives include:

- ethical management
- economics
- integrative thinking
- human resources

Additional Information

For additional information about this program, visit the College's Master of Science in Leadership (http://www.lebow.drexel.edu/Prospects/Masters/Leadership.php) website.

Admission

Designed to optimize leadership potential, the target audience for the MS in Leadership program is a student who: seeks a less quantitative-based and more abstract master's degree than the MBA; is a working professional with over five years of experience in a management or management-track position; has an undergraduate degree in a non-business area of study; is interested in developing (a) general business knowledge; (b) a foundation in leadership; (c) a better understanding of the laws and policies impacting industry, and (d) an ethical approach to decision-making.

Applications are reviewed on a rolling basis, with decisions provided within two weeks of file completion.

All applicants must have earned a four-year bachelor's degree from an accredited college or university to be considered for admission to graduate programs at Drexel University. The Committee reviews applications based on undergraduate record, quality and quantity of professional experience, clarity of career goals, professional references, statement of purpose and professional resume. No standardized test is required for this program.

For more details about how to apply to this program, including deadlines, visit the College's Graduate Admissions (http://www.lebow.drexel.edu/Prospects/Apply/Graduate/HowToApply.php) website.

Degree Requirements

Foundation Courses

BUSN 505	Financial Performance of the Firm - Accounting	1.5
BUSN 506	Financial Performance of the Firm - Finance	1.5
BUSN 507	Essentials of Economics I	1.5
BUSN 508	Essentials of Economics II	1.5
Core Courses		
BLAW 605	Legal Options in Decision Making	3.0
ECON 601	Managerial Economics	3.0
ORGB 625	Leadership and Professional Development	3.0
MKTG 601	Marketing Strategy & Planning	3.0
Leadership Courses		
ORGB 640	Negotiations for Leaders	3.0
ORGB 631	Leading Effective Organizations	3.0
Legal Studies		
BLAW 620	Legal Aspects of Employment	3.0
BLAW 624	Social Forces and the Law	3.0
Management Courses		
MGMT 640	Strategic Human Resource Management	3.0
MGMT 670	Business Ethics	3.0
Economics		
ECON 698	Course ECON 698 Not Found (Economics of Social Justice)	3.0
Capstone Courses		
MGMT 680	Leading for Innovation	3.0
MGMT 698	Course MGMT 698 Not Found (Sustainability)	3.0
Total Credits		**45.0**

Management Faculty

Shanti Dewi Anak Agung Istri, PhD *(Georgia Institute of Technology)*. Assistant Professor. Technology commercialization; technology entrepreneurship.

Murugan Anandarajan, PhD *(Drexel University) Head of Department, Management*. Professor. Individual Internet usage behavior (specifically abuse and addiction); Application of artificial intelligence techniques in forensic accounting and ophthalmology.

Orakwue B. Arinze, PhD *(London School of Economics)*. Professor. Client/Server computing; Enterprise Application Software (EAS)/Enterprise Resource Planning Software (ERP); knowledge-based and decision support applications in operations management.

Suresh Chandran, PhD. Associate Clinical Professor. Corporate entrepreneurship; corporate social responsibility; global management; intellectual property and employee rights.

Qizhi Dai, PhD *(University of Minnesota)*. Associate Professor. Business to Business E-Commerce; information technology adoption; economic analysis of information systems.

Donna Marie De Carolis, PhD *(Temple University) Dean, Close School of Entrepreneurship*. Professor. Pharmaceutical/biotechnology industries;

entrepreneurship; technology & strategy; technology commercialization, strategic alliances; social capital.

David Gefen, PhD *(Georgia State University)*. Professor. Strategic IT management; IT development and implementation management; research methodology; managing the adoption of large IT systems, such as MRP II, ERP, and expert systems; research methodology.

Azi Gera, PhD *(University of Maryland)*. Assistant Professor. Business planning, new venture performance and survival, social networking, cognition and strategy, determinants of firm performance, attention based view, business angles and VC firms, interfirm signaling, private equity investments.

Cuneyt Gozu, PhD *(University of Albany)*. Associate Clinical Professor.

Jeffrey H. Greenhaus, PhD *(New York University) William A. Mackie Professor of Management*. Professor. Career management, career decision making, work-family linkages, managing diversity,career and adult life development, organizational behavior/human resources, job design, models of work motivation and job attitudes, human resource staffing.

Mazhar Islam, PhD *(University of Minnesota)*. Assistant Professor. New markets in emerging countries, alliances, corporate entrepreneurship, emerging countries, pharmaceutical and biotechnology industry, technological innovation, transaction cost economics.

Robert W. Keidel, PhD *(Wharton School, University of Pennsylvania)*. Clinical Professor. Organization design and change, management of technology, strategic cognition.

Keisha Liggett-Nichols, EDB *(Georgia State University)*. Associate Clinical Professor. Corporate entrepreneurship, determinants of firm performance, evidence-based management.

Frank Linnehan, PhD *(Temple University) Interim Dean, LeBow College of Business*. Professor. Affirmative action; workforce diversity; equal employment; school-to-work transitions for younger workers. Research focuses on issues of race and diversity in the workplace.

Yu-Chieh Lo, PhD *(University of Southern California)*. Assistant Professor. Organization theory, technology entrepreneurship.

Mark Loschiavo, MS *(University of Kentucky)*. Clinical Professor. Business planning; new venture performance and survival; strategic management; strategic thinking; technology entrepreneurship.

Dali Ma, PhD *(University of Chicago)*. Assistant Professor. Status dynamics, social networks, founding team formation; venture capital syndication; family business; Chinese private entrepreneurship.

Michele K. Masterfano, DBA *(Argosy University of Sarasolta)*. Associate Clinical Professor. Entrepreneurship/small business administration, business planning, social capital, social networking.

Mary Mawritz, PhD *(University of Central Florida)*. Assistant Professor. Abusive supervision; deviant behavior; leadership.

Suchet Nadkarni, PhD *(University of Kansas)*. Associate Professor. Strategic management, cognition and strategy.

V. K. Narayanan, PhD *(University of Pittsburgh) Delloitte Touche Jones Stubbs Professor; Associate Dean of Research, Department of Management*. Corporate and business strategy; management of

technology and innovation; strategy implementation; macro environmental analysis; knowledge management; competitor analysis and intelligence.

Haemin Park, PhD *(University of Washington).* Assistant Professor. Corporate entrepreneurship; IPO; knowledge-based view of the firm; new venture performance and survival; technology entrepreneurship; venture capital.

Christian Resick, PhD *(Wayne State University).* Associate Professor. Linkages between CEO personality with organizational culture, climate, and effectiveness; cross-cultural studies of ethical leadership beliefs and behaviors; roles of team leadership and member personality in building shared cognition and effective teamwo

Stanley Ridgley, PhD *(Duke University).* Assistant Clinical Professor. Business communication; cognition and strategy; competitive intelligence; determinants of firm performance; new markets in emerging countries; Russian business culture.

Raja Roy, PhD *(University of Pittsburgh).* Assistant Professor. Technology entrepreneurship, determinants of firm performance, technological change, technological innovation.

Samir Shah, DPS *(Pace University).* Associate Clinical Professor.

Sidney R. Siegel, PhD *(Drexel University).* Professor. Organizational change, development and behavior.

Daniel Tzabbar, PhD *(University of Toronto).* Assistant Professor. Business planning, social capital, technology entrepreneurship, alliances, human capital, innovation management, strategic management.

Joan Weiner, PhD *(The Wharton School, University of Pennsylvania).* Professor. Business ethics, leadership, communication and decision making; educational innovation; health system management design.

Jonathan C. Ziegert, PhD *(University of Maryland).* Associate Professor. Leadership; team dynamics; group performance; attraction and recruitment; discrimination.

Emeritus Faculty

Milton Silver, PhD *(Columbia University).* Professor Emeritus. Strategic planning and control systems, analysis and design of information systems, and executive and management development and training.

Marketing

Major: Marketing
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.1401
Standard Occupational Classification (SOC) code: 11-2021

About the Program

The MS in Marketing provides students with a more focused training in marketing science and it develops the technical skills necessary for success in today's business environment. Marketers require a higher level of technical capabilities to respond to today's dynamic marketing. At the same time, new tools such as neuroscience and analytics empower marketers to better understand customers and respond to their needs

and wants. These skills require a higher level of training that this degree provides.

Admission Requirements

The LeBow College of Business seeks applicants with exceptional ability and motivation. Students who hold a bachelor's degree, either in Marketing or another discipline, may apply to the MS program. Students who lack some part of this preparation may be considered for admission conditional on their completing the appropriate undergraduate courses as non-matriculated students during the summer term before they begin the program in the fall.

In reviewing an applicant's credentials, the following factors will be considered:

- **Prior Academic Accomplishments**: All course work taken prior to application will be examined, paying particular attention to the specific courses that have been completed. Applicants should have attained a minimum grade point average (GPA) of 3.0 (on a 4.0) scale for all undergraduate course work completed.
- **Graduate Record Examination (GRE) or Graduate Management Aptitude Test (GMAT):** Applicants are required to submit GRE or GMAT scores. Scores of more than five years old are not accepted.
- **Test of English as a Foreign Language (TOEFL):** Applicants whose native language is not English and who have not already received a degree from a U.S. university must also submit scores from the Test of English as a Foreign Language (TOEFL).
- **Personal Statement/Essay:** Each applicant must submit a personal statement. The personal statement should explain the applicant's educational and personal experiences that have influenced the decision to pursue an MS and should discuss the candidate's career plans and goals.
- **Letters of Recommendation:** Two letters of recommendation must be submitted in support of the application. Applicants are strongly encouraged to seek recommendations from academics or other professionals who can assess the applicant's likelihood of success in the MS program.

Degree Requirements

Required Courses

MKTG 601	Marketing Strategy & Planning	3.0
MKTG 622	Buyer Behavior Theory	3.0
MKTG 630	Global Marketing	3.0
MKTG 652	Marketing Information Management and Research	3.0
STAT 601	Business Statistics	3.0
Required Electives - Choose 7 of the following (2 must be from MKTG)		21.0
BMES 509	Entrepreneurship for Biomedical Engineering and Science	
BMES 510	Biomedical Statistics	
BMES 524	Introduction to Biosensors	
BMES 538	Biomedical Ethics and Law	
BMES 551	Biomedical Signal Processing	
BMES 621	Medical Imaging Systems I	
MKTG 606	Customer Analytics	
MKTG 607	Marketing Experiments	

MKTG 634	Integrated Marketing Communications Management	
MKTG 638	New Product Planning, Strategy, and Development	
MKTG 646	Services Marketing	
MKTG 654	Corporate Brand & Reputation Management	
PSY 512	Cognitive Psychology	
PSY 611	Computer-Based Research Methods for Psychological Research	
PSY 615	Judgment & Decision-making	
PSY 811	Multilevel Regression	
PSY 812	Cognitive Neuroscience	
Internship/Practicum		9.0
BUSN 615	Graduate Internship	
Total Credits		**45.0**

Marketing Faculty

Rolph E. Anderson, PhD *(University of Florida) Royal H. Gibson Sr. Professor of Marketing*. Professor. Personal selling and sales management; multivariate data analysis; customer relationship management (CRM); customer satisfaction and customer loyalty.

Trina Larsen Andras, PhD *(University of Texas at Austin) Head of the Department of Marketing; Academic Director, Center for Corporate Research Management*. Professor. International marketing, marketing channels management, cross-cultural communication.

Michaela Draganska, PhD *(Kellog School of Management, Northwestern University)*. Associate Professor. Advertising strategy, product assortment decisions, new product positioning, distribution channels.

Larry Duke, MBA *(Harvard Business School)*. Associate Clinical Professor. International marketing and strategy, new product development, business-to-business marketing, marketing of financial services.

Michael Howley, PhD *(Arizona State University)*. Associate Clinical Professor. Investments in dissatisfied customers, service recovery, health care marketing, marketing of service organizations, financial consequences of marketing actions.

Yanliu Huang, PhD *(The Wharton School, University of Pennsylvania)*. Assistant Professor. Consumer n-store decision making, consumer planning, health marketing, memory and learning.

Daniel Korshun, PhD *(Boston University)*. Assistant Professor. Brand and corporate reputation management, corporate social responsibility, internal marketing, marketing strategy, relationship marketing.

Hyokjin Kwak, PhD *(University of Georgia) Department of Marketing*. Associate Professor. Advertising effects, consumer behaviors and e-commerce.

Bert Rosenbloom, PhD *(Temple University) Rauth Chair of Electronic Commerce*. Professor. Marketing channels and distribution systems, electronic commerce, interorganizational marketing management, wholesale and retail distribution, marketing strategy and planning.

Prashant Srivastava, PhD *(Oklahoma State University)*. Associate Clinical Professor. New product development, supply chain management, B2B marketing, sales, strategic alliances, organizational learning, market orientation, healthcare marketing, and database marketing.

Rajneesh Suri, PhD *(University of Illinois at Urbana-Champaign)*. Professor. Pricing, promotions and branding.

Srinivasan Swaminathan, PhD *(University of Texas-Austin)*. Professor. Marketing research and strategy, pricing and promotions, loyalty and satisfaction.

An Tran, PhD *(University of Colorado--Boulder)*. Assistant Clinical Professor. Intertemporal choice, the psychology of time and money, consumer planning, financial decision making.

Supply Chain Management and Logistics

Major: Supply Chain Management and Logistics
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.0203
Standard Occupational Classification (SOC) code: 11-3071

About the Program

Today, companies worldwide are competing in very different ways and very different environments than they were in the past because of technological advances. Operations, Supply Chain Management, and Logistics are key functions through which companies can gain strategic advantage, and companies are hiring graduates to drive innovations for their new economic surroundings.

The Drexel MS Program in Supply Chain Management and Logistics is delivered in two tracks:

- For students in the **Industry Professional Track**, we are committed to increasing their supply chain competencies and leadership abilities. We work with organizations and leaders from around the world to help shape strategies that inspire competitive advantage and business success.
- For students in the **Research Track**, we leverage industry relationships to inform the development of theory and models that advance the field. Research seminars led by our top-notch faculty prepare our MS students to enter PhD programs and become academic leaders.

Additional Information

For additional information about the program or to schedule an appointment, please contact the Department of Decision Sciences and MIS (http://www.lebow.drexel.edu/Faculty/Departments/Decision).

Major: Supply Chain Management and Logistics
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.0203
Standard Occupational Classification (SOC) code: 11-3071

Degree Requirements

All students will be required to take a series of foundation courses in the management of operations and the quantitative methods that support analysis and decision making for supply chain management and logistics.

After the common core, the students will choose one of the following tracks:

(1) *Industry Professional Track*: This track covers a range of topics for practical management decisions over multiple horizons for different types of supply chains and prepares the students for effective leadership in an increasingly complex, dynamic, global business environment. For those students with a bachelor's degree in engineering, we also encourage them to take advantage of the Certificate in Systems Engineering Integrated Logistics (p. 330), offered by the College of Engineering.

(2) *Research Track*: This track goes deeper into the theoretical foundations of decision making in supply chains and prepares students for doctoral studies in the area.

Foundations:

POM 601	Operations Management	3.0
POM 602	Strategic Operations & Quality	3.0
POM 620	Management of Manufacturing Firms	3.0
POM 624	Management of Service Firms	3.0
POM 625	Supply Chain Management	3.0
Quantitative Methods		
STAT 601	Business Statistics	3.0
OPR 601	Managerial Decision Models and Simulation	3.0
Select one of the following tracks:		24.0
Industry Professional Track		
MIS 661	Managing with Enterprise Application Software using SAP - Logistics	
POM 622	Materials Management	
STAT 634	Quality & Six-Sigma	
Select four of the following:		
BUSN 502	Essentials of Economics	
ECON 610	Microeconomics	
ECON 630	International Economics	
ECON 650	Business & Economic Strategy: Game Theory & Applications	
MIS 651	Information Systems Outsourcing Management	
MIS 662	Managing with Enterprise Application Software using SAP-Accounting & Analytics	
OPR 640	Decision Models for the Public Sector	
ORGB 625 or ORGB 631	Leadership and Professional Development Leading Effective Organizations	
ORGB 640	Negotiations for Leaders	
POM 642	Sustainable Supply Chain Management and Logistics	
POM 643	Managing Queues for Service Operations	
POM 644	Revenue Management	
STAT 638	Advanced Statistical Quality Control	
POM 770	Supply Chain Management and Logistics Practicum	
Research Track		
POM 771	Supply Chain Management and Logistics Master's Thesis	
OPR 922	Operations Research Methods I	
POM 900	Decision Processes in Operations Management	
POM 922	Inventory Models Seminar	

POM 925	Supply Chain Management Seminar	
POM 930	Scheduling Theory	
Total Credits		**45.0**

Sample Plan of Study

Plan of Study for the Industry Professional Track:

First Year		
Fall		**Credits**
OPR 601	Managerial Decision Models and Simulation	3.0
POM 601	Operations Management	3.0
STAT 601	Business Statistics	3.0
	Term Credits	**9.0**
Winter		
POM 620	Management of Manufacturing Firms	3.0
POM 624	Management of Service Firms	3.0
Track Elective 1		3.0
	Term Credits	**9.0**
Spring		
POM 602	Strategic Operations Quality	3.0
POM 625	Supply Chain Management	3.0
Track Elective 2		3.0
	Term Credits	**9.0**
Summer		
STAT 634	Quality Six-Sigma	3.0
Track Elective 3		3.0
Track Elective 4		3.0
	Term Credits	**9.0**
Second Year		
Fall		
MIS 661	Managing with Enterprise Application Software using SAP - Logistics	3.0
POM 622	Materials Management	3.0
POM 770	Supply Chain Management and Logistics Practicum	3.0
	Term Credits	**9.0**

Total Credit: 45.0

Plan of Study for the Research Track

First Year		
Fall		**Credits**
OPR 601	Managerial Decision Models and Simulation	3.0
POM 601	Operations Management	3.0
STAT 601	Business Statistics	3.0
	Term Credits	**9.0**
Winter		
OPR 922	Operations Research Methods I	3.0
POM 620	Management of Manufacturing Firms	3.0
POM 624	Management of Service Firms	3.0
	Term Credits	**9.0**

Spring

POM 602	Strategic Operations Quality	3.0
POM 625	Supply Chain Management	3.0
POM 900	Decision Processes in Operations Management	3.0
	Term Credits	**9.0**

Summer

POM 771	Supply Chain Management and Logistics Master's Thesis	9.0
	Term Credits	**9.0**

Second Year
Fall

POM 922	Inventory Models Seminar	3.0
POM 925	Supply Chain Management Seminar	3.0
POM 930	Scheduling Theory	3.0
	Term Credits	**9.0**

Total Credit: 45.0

Business Administration

Major: Business Administration
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 60.0 (Post-Master's) or 90.0 (Post-Bachelor's)
Classification of Instructional Programs (CIP) code: 52.0101
Standard Occupational Classification (SOC) code: 11-1021

About the Program

Drexel's PhD in Business Administration program prepares candidates for careers in academic research and teaching. The Drexel program is characterized by a healthy respect for the interrelations among the different branches of knowledge and a close, collaborative relationship between each PhD candidate and the faculty. Lebow's faculty take a hands-on approach to research and mentoring students on a daily basis. The support of LeBow's collaborative, collegial research environment provides our doctoral students with tremendous research opportunities.

The program enables students to complete their doctoral coursework in two years. Students begin specializing in their chosen area during the first year of study. Specializations are available in five areas: accounting, decision sciences, finance, marketing, and management (organization and strategy). For information about doctoral work in economics, please visit the PhD in Economics (http://catalog.drexel.edu/graduate/collegeofbusiness/economics) page.

PhD students complete a minimum of 60.0 quarter credits beyond the master's degree. Students who enter the program without a master's degree must complete 90.0 credits beyond the bachelor's degree. Degree Requirements (http://catalog.drexel.edu/graduate/collegeofbusiness/business/#degreerequirementstext) describe the basic structure of the PhD in Business curriculum.

For additional information about the program visit the PhD Program in Business (http://www.lebow.drexel.edu/Prospects/Doctorate) page.

Admission Requirements/Financial Aid

The LeBow College of Business seeks applicants with exceptional ability and motivation who can succeed in a research-oriented program.

Admission to this full-time program is competitive and highly selective. Applicants are only admitted for full-time status. Applicants must specify their proposed area of specialization, and their credentials are ultimately compared to the credentials of other applicants in the same specialization area. There may be relatively few openings in a given area. A master's degree is not a requirement, although most admitted students have one.

In reviewing an applicant's credentials, the faculty consider the following factors:

- *Prior Academic Accomplishments:* The faculty will examine all course work taken prior to application, paying particular attention to the specific courses that have been completed. Applicants should have attained a minimum grade point average of 3.0 (on a 4.0 scale) for all undergraduate course work completed. They also should have attained a minimum 3.3 average for any graduate-level course work taken. The faculty generally expect applicants to demonstrate a substantially higher level of accomplishment than these minimum requirements.

- *Graduate Management Admissions Test (GMAT) or Graduate Records Examination (GRE)*: Applicants to all specializations within the PhD program are required to submit scores from either the GMAT or GRE. While all specializations will accept either one, applicants applying to the Accounting, Management (Organization or Strategy), Finance, or Marketing specializations should submit GMAT scores. Applicants to the specializations in Decision Sciences or Economics should submit the GREs. GMAT and GRE scores are not accepted if they are more than five years old.

- *Test of English as a Foreign Language (TOEFL)*: Applicants whose native language is not English and who have not already received a degree from a U.S. university, must also submit scores from the Test of English as a Foreign Language (TOEFL).

- *Personal Statement/Essay*: Each applicant must submit a personal statement. The personal statement should explain the applicant's educational and personal experiences that have influenced the decision to pursue a PhD and should discuss the candidate's career plans and goals. The faculty are especially interested in learning about an applicant's prior research experience and the commitment to future research in the applicant's area of specialization.

- *Letters of Recommendation*: Two letters of recommendation must be submitted in support of the application. Applicants are strongly encouraged to seek recommendations from academics or other professionals who can assess the applicant's likelihood of success in a research-oriented PhD program.

Admission Procedures

The PhD Program in Business admits students each fall. To be considered for admission, the completed application must be received by the LeBow College of Business Office of Graduate Admissions no later than January 15th. It is the applicant's responsibility to ensure that all transcripts, test scores and letters of recommendation, as well as the application form and the personal statement, are received by Drexel University no later than January 15th.

Assistantships and Financial Aid

The LeBow College of Business strives to provide a graduate assistantship to each entering PhD student. Therefore, each applicant to the PhD program is automatically considered for a graduate assistantship as well as for admissions into the program. First-year graduate assistants are assigned to work with a faculty member on research activities. During the second and subsequent years, graduate assistants are generally

assigned a combination of teaching and research responsibilities. Assistants receive a stipend and 27 credits of tuition remission per academic year. Doctoral students who are making satisfactory progress toward the degree can expect to be provided with an assistantship for at least four years.

For questions about applying, please contact:

The LeBow Ph.D. Program Office
Bennett S. LeBow College of Business
Drexel University
3141 Chestnut Street
Philadelphia, PA 19104-2875
lebowphd@drexel.edu

Degree Requirements

60 credits (Post-Master's degree)
90 credits (Post-Bachelor's degree)

- 15.0 credits of core courses
- 30.0 credits of specialization requirements
- 15.0 credits of dissertation research
- 30.0 credits for students without Master's degree

Core Program

PhD students in business select one of two broad streams of research:

- behavioral based research; or
- economics based research.

Within each stream all students pursue a common set of core courses during their first year of study. This core consists of course work in research methodology (three courses) and economics (two courses) or behavioral science (two courses). In addition to these core courses, students also take courses in their specializations during their first year in the program.

Each research stream consists of 5 core courses. All courses are 3.0 credits each.

Economics Stream Core Courses [*]

ECON 902	Mathematical Economics	3.0
ECON 910	Advanced Microeconomics I	3.0
ECON 940	Econometrics I	3.0
ECON 941	Econometrics II	3.0
STAT 931	Statistics for Economics	3.0
Total Credits		**15.0**

[*] Decision Sciences students may make substitutions for the econometrics series. Their research methodology sequences is comprised of Statistics, STAT 924 Multivariate Analysis I and OPR 922 Operations Research Methods I.

Economics Stream First Year Core Sequence

Fall		**Credits**
ECON 902	Mathematical Economics	3.0
STAT 931	Statistics for Economics	3.0
	Term Credits	**6.0**
Winter		

ECON 910	Advanced Microeconomics I	3.0
ECON 940	Econometrics I	3.0
	Term Credits	**6.0**
Spring		
ECON 941	Econometrics II	3.0
	Term Credits	**3.0**

Total Credit: 15.0

Behavioral Stream

Behavioral Stream Core Courses

STAT 924	Multivariate Analysis I	3.0
STAT 932	Statistics for Behavioral Science	3.0
MGMT 906	Foundations of Research in Behavioral Science	3.0
MGMT 907	Research Analysis in Behavioral Sciences	3.0
MKTG 940	Multivariate II	3.0
Total Credits		**15.0**

Behavioral Stream First Year Core Sequence

Fall		**Credits**
MGMT 906	Foundations of Research in Behavioral Science	3.0
STAT 932	Statistics for Behavioral Science	3.0
	Term Credits	**6.0**
Winter		
MGMT 907	Research Analysis in Behavioral Sciences	3.0
STAT 924	Multivariate Analysis I	3.0
	Term Credits	**6.0**
Spring		
MKTG 940	Multivariate II	3.0
	Term Credits	**3.0**

Total Credit: 15.0

First-Year Examination

After the completion of the core coursework, students are examined on their competence in the core material and their readiness to proceed to their specialization area.

Specialization

The PhD Program in Business offers specializations in six areas:

- Accounting
- Decision Sciences
- Finance
- Marketing
- Organizational Behavior (Management)
- Strategy (Management)

Each specialization area consists of 10 courses (30 credits) in addition to the 5 stream courses. The courses outside of the stream courses are either department requirements or electives selected by the student with the approval of their PhD coordinator. Up to 3 of the electives may be independent studies or dissertation research courses subject to the approval of the student's PhD coordinator and the Director of the LeBow PhD Program. The requirements of each area of specialization are discussed in detail on the Lebow College of Business PhD Program Areas

of Specialization (http://www.lebow.drexel.edu/Prospects/Doctorate/Specialization.php) web page.

Candidacy Examination

At the completion of their coursework, students take written and oral candidacy examinations. These examinations test each student's preparation for dissertation research. Once the candidacy examinations are passed, the student is recognized as a PhD candidate.

Doctoral Dissertation

The doctoral dissertation is a piece of original research designed to make a contribution to the student's chosen discipline. Each candidate selects a dissertation adviser and an advisory committee of additional faculty members is formed. The candidate prepares a detailed dissertation proposal that is defended before the University community. After successfully defending the proposal, the candidate conducts the research (15-credit minimum) and prepares a written dissertation. The completed dissertation is then defended in a final oral examination.

Dissertation Format Review

In addition to meeting the Thesis Advisory Committee's standards of originality and scholarly content, all doctoral dissertations must conform to university format requirements. Students should obtain a copy of the Thesis Manual from the Graduate College of Drexel University (http://www.drexel.edu/graduatecollege) or from the Thesis Reviewer in 5038 MacAlister Hall.

Economics

Major: Economics
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 45.0601
Standard Occupational Classification (SOC) code: 19-3011

About the Program

The Master of Science program in Economics at Drexel University integrates training in core economics, rigorous quantitative methods and policy analysis. It prepares students for a career in industry, the financial sector, government or international organizations. The program also provides the necessary knowledge and the analytical skills to the students wishing to pursue a PhD degree in related areas.

Admission Requirements

The LeBow College of Business: School of Economics seeks applicants with exceptional ability and motivation. Students who hold a bachelor's degree, either in economics or another discipline, may apply to the MS program. All courses in the program expect a preparation of at least principles of economics and basic statistics. Students who lack some part of this preparation may be considered for admission conditional on their completing the appropriate undergraduate courses as non-matriculated students during the summer term before they begin the program in the fall.

In reviewing an applicant's credentials, the faculty will consider the following factors:

- **Prior Academic Accomplishments:** The faculty will examine all course work taken prior to application, paying particular attention to

the specific courses that have been completed. Applicants should have attained a minimum grade point average of 3.0 (on a 4.0 scale) for all undergraduate course work completed.

- **Graduate Record Examination (GRE) or Graduate Management Aptitude Test (GMAT):** Applicants are required to submit GRE or GMAT scores. Scores of more than five years old are not accepted.
- **Test of English as a Foreign Language (TOEFL):** Applicants whose native language is not English and who have not already received a degree from a U.S. university must also submit scores from the Test of English as a Foreign Language (TOEFL).
- **Personal Statement/Essay:** Each applicant must submit a personal statement. The personal statement should explain the applicant's educational and personal experiences that have influenced the decision to pursue an MS and should discuss the candidate's career plans and goals.
- **Letters of Recommendation:** Two letters of recommendation must be submitted in support of the application. Applicants are strongly encouraged to seek recommendations from academics or other professionals who can assess the applicant's likelihood of success in the MS program.

Admission Procedures

The MS in Economics program admits students each fall. To be considered for admission, the completed application must be received by the LeBow College of Business Office of Graduate Admissions. Admissions are considered on a rolling basis and will remain open until all available slots are filled. It is the applicant's responsibility to ensure that all transcripts, test scores and letters of recommendation, as well as the application form and the personal statement, are received by LeBow College Business, School of Economics.

Graduate Assistantships and Financial Aid

Financial assistance for the MS program may be available on a limited basis to highly qualified candidates.
Research Assistantships and Teaching Assistantships may be also be available on a limited basis for highly qualified candidates.

To obtain an application, please contact:

Graduate Admissions Office
Bennett S. LeBow College of Business
Drexel University
3141 Chestnut Street
Philadelphia, PA 19104-2875
215.895.6804
msecon@lebow.drexel.edu

Degree Requirements

Core Requirements

Select one course from each of the following sets:		
ECON 548	Mathematical Economics	3.0
or ECON 902	Mathematical Economics	
ECON 550	Econometrics	3.0
or ECON 940	Econometrics I	
ECON 560	Time Series Econometrics	3.0
or ECON 941	Econometrics II	
ECON 610	Microeconomics	3.0
or ECON 910	Advanced Microeconomics I	

ECON 614	Macroeconomics	3.0
or ECON 920	Advanced Macroeconomics I	
STAT 601	Business Statistics	3.0
or STAT 931	Statistics for Economics	

Economics electives [*]

Complete 18.0 additional credits from the following:		18.0
ECON 601	Managerial Economics	
ECON 616	Public Finance and Cost Benefit Analysis	
ECON 630	International Economics	
ECON 634	History of Economic Analysis	
ECON 639	Applied Industrial Analysis	
ECON 650	Business & Economic Strategy: Game Theory & Applications	
ECON 661	Health Economics	
ECON 662	Economic Analysis of Health Systems	
ECON T680	Special Topics in ECON	
ECON 700	Economics Seminar	
ECON 902	Mathematical Economics	
ECON 910	Advanced Microeconomics I	
ECON 911	Advanced Microeconomics II	
ECON 920	Advanced Macroeconomics I	
ECON 921	Advanced Macroeconomics II	
ECON 925	Macroeconomic Dynamics	
ECON 940	Econometrics I	
ECON 941	Econometrics II	
ECON 942	Applied Microeconometrics	
ECON 950	Industrial Organization I	
ECON 951	Industrial Organization II	
ECON 959	Industrial Organization Seminar	
ECON 960	International Trade	
ECON 961	Empirical International Trade	
ECON 962	Open Economy Macroeconomics	
ECON 969	International Trade Seminar	
ECON 979	Open Economy Macro Seminar	
ECON 980	Game Theory	
INTB 632	Economic Analysis of Multinational Corporations	
STAT 931	Statistics for Economics	

Business electives

Complete 9 additional credits from the list of Economics electives or the list below:		9.0
BLAW 605	Legal Options in Decision Making	
BLAW 620	Legal Aspects of Employment	
BLAW 630	Government and Business	
BUSN 501	Measuring and Maximizing Financial Performance	
BUSN 615	Graduate Internship	
FIN 601	Corporate Financial Management	
FIN 602	Advanced Financial Management	
FIN 622	Financial Institutions & Markets	
FIN 635	Entrepreneurial Finance	
FIN 640	Mergers and Acquisitions	
FIN 648	International Financial Management	
MGMT 602	Managing Technology Innovation	

MKTG 630	Global Marketing	
OPR 601	Managerial Decision Models and Simulation	
OPR 620	Operations Research I	
OPR 622	Operations Research II	
OPR 624	Advanced Mathematical Program	
STAT 622	Statistical Decision Theory I	
STAT 624	Statistical Decision Theory II	
STAT 626	Statistical Sampling	
Total Credits		**45.0**

[*]   Students who complete ECON 911, ECON 921 and ECON 941 may take the following courses during their second year provided they have the required prerequisites and approval from the Program Coordinator: ECON 925, ECON 942, ECON 950, ECON 951, ECON 959, ECON 960, ECON 961, ECON 962, ECON 969, ECON 979

Centers and Facilities

This marriage of academic rigor and practical applications can also be seen in the development of the school's Centers of Excellence. Centers of Excellence are catalysts for research and innovation, think tanks for nationally significant trends and issues, and incubators for opportunities in business and integration among disciplines. LeBow's Centers of Excellence provide students with meaningful experiential learning and impact the performance of business in our region and around the world. As part of the curriculum Drexel LeBow MBA students will take courses which reside in the centers and will see firsthand how practical learning is applied.
The Centers are:

- Sovereign Institute for Strategic Leadership (https://www.lebow.drexel.edu/academics/centers)
- Center for Corporate Governance (https://www.lebow.drexel.edu/academics/centers/corporate-governance)
- Dana and David Dornsife Center for Experiential Learning (https://www.lebow.drexel.edu/academics/centers/experiential-learning)

Facilities

In fall 2013, LeBow College opened its 12-story, Gerri C. LeBow Hall, with a finance trading lab, behavioral studies lab and integrated teaching technology in all classrooms. The new building features two lecture halls, 15 classrooms of varying sizes and seating configurations, including case study rooms and cluster classrooms designed to facilitate group work. Other amenities consist of extensive areas of student spaces, including 12 collaboration rooms, two quiet study areas, and 3,500 square feet of student lounges. Gerri C. LeBow Hall brings together faculty, students and staff, in a state of the art building on the University City campus.

Economics and International Business Faculty

Marco Airaudo, PhD *(University of Pennsylvania Philadelphia)*. Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.

Richard Barnett, PhD *(University of Minnesota)*. Associate Clinical Professor. Economic theory, macroeconomics.

Sebastien Bradley, PhD *(University of Michigan)*. Assistant Professor. Public finance, international economics.

Mian Dai, PhD *(Northwestern University).* Assistant Professor. Managerial economics and strategy.

Pia DiGirolamo, PhD *(Purdue University).* Assistant Clinical Professor. Macroeconomics, international finance.

Anne Duchene, PhD *(Ecole Nationale des Ponts et Chaussees, France) Department of Economics and International Business.* Assistant Professor. Microeconomics, industrial organization, law and economics.

Ramya Ghosh, PhD *(Claremont Graduate University).* Assistant Clinical Professor. International economics.

Shawkat M. Hammoudeh, PhD *(University of Kansas) Department of Economics and International Business.* Professor. Applied econometrics, financial economics, international economics, natural resource economics.

Teresa D. Harrison, PhD *(University of Texas at Austin) Department of Economics and International Business.* Associate Professor. Econometrics, public finance, industrial organization, empirical microeconomics including health and nonprofit organizations.

Paul E. Jensen, PhD *(Penn State University) Associate Dean, College of Business.* Associate Professor. International trade. Primary research interest is international trade, particularly in empirical studies of international trade patterns.

Bang Nam Jeon, PhD *(Indiana University) Department of Economics and International Business.* Professor. Financial economics, world financial market linkages, foreign direct investment flows in the Asia-Pacific economies, the Korean economy: currency crisis, FDI, and macroeconomic issues, regional economic integration and newly industrializing economies: the

Stephen Joyce, MA *(Temple University) Department of Economics and International Business.* Assistant Clinical Professor. Education and human capital.

Christopher A. Laincz, PhD *(Duke University) Department of Economics and International Business.* Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Bijou Yang Lester, PhD *(University of Pennsylvania) Department of Economics and International Business.* Professor. Behavioral characteristics of shopping on-line, economic issues of electronic commerce, contingent employment and part-time work, the economy and suicide.

Vibhas Madan, PhD *(Michigan State University) Head of the Department of Economics and International Business.* Professor. International trade theory, applied microeconomics.

Roger A. McCain, PhD *(Louisiana State University) Department of Economics and International Business.* Professor. Computational economics, game theory.

Irina Murtazashvili, PhD *(Michigan state University).* Assistant Professor. Applied econometrics.

Maria Olivero, PhD *(Duke University) Department of Economics and International Business.* Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA *(American University) Department of Economics and International Business.* Clinical Associate Professor. Macroeconomics, political economy.

Konstantinos Serfes, PhD *(University of Illinois at Champaign-Urbana) Department of Economics and International Business.* Associate Professor. Industrial organization; microeconomics.

Mark Stehr, PhD *(University of California at Berkeley) Department of Economics and International Business.* Associate Professor. Health Economics, public finance, public policy.

Constantinos Syropoulos, PhD *(Yale University) Trustee Professor of International Economics, Department of Economics and International Business.* Professor. International trade, political economy, applied microeconomics.

Matthew Weinberg, PhD *(Princeton University).* Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Yoto Yotov, PhD *(Boston College).* Associate Professor. International trade, applied microeconomics, political economy.

Interdepartmental Faculty

Bruce D. McCullough, PhD *(University of Texas) Department of Decision Sciences.* Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Emeritus Faculty

Edward C. Koziara, PhD *(University of Wisconsin) Department of Economics and International Business.* Professor Emeritus. Applied micro and macro economics.

Andrew G. Verzilli, PhD *(Boston College).* Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Chiou-shuang Yan, PhD *(Purdue University).* Professor Emeritus. International economics, input-output analysis.

Economics

Major: Economics
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 60.0 (Post-Master's degree) or 90.0 (Post-Bachelor's degree)
Classification of Instructional Programs (CIP) code: 45-0601
Standard Occupational Classification (SOC) code: 19-3011

About the Program

Drexel's PhD program in Economics prepares economists for academic research as well as careers in government or industry by providing a solid background in economic theory, quantitative analysis, and analytical tools at the advanced level. Each year a relatively small number of PhD students are accepted into the program, which allows for a collegial environment where the PhD students interact with faculty on a daily basis. Requirements for the MS in Economics program are satisfied if the coursework associated with the first and second years of the PhD program are complete.

The PhD program in Economics offers three fields of study:

- industrial organization
- international trade
- open economy macroeconomics

The PhD program in Economics is also particularly strong in applied microeconometrics.

Students typically complete their coursework in two years and the PhD degree in five. Students work as research and teaching assistants under the supervision of a faculty member. After their second year, students can teach independently.

Additional information can be found online at the PhD Program in Economics (http://www.lebow.drexel.edu/Prospects/Doctorate/Econ) page as well as in the LeBow College of Business PhD Programs Handbook (http://www.lebow.drexel.edu/Current/Doctorate).

To apply and for application information please check online at the LeBow PhD Admissions (http://www.lebow.drexel.edu/resources/admissions/phd) webpage.

Questions should be addressed to lebowphd@drexel.edu.

Admission Requirements

The LeBow College of Business: School of Economics seeks applicants with exceptional ability and motivation. For the PhD, the School places emphasis on applicants who can provide evidence of strong potential in a research-oriented program. In general, prior training at either the undergraduate or graduate level in economics and mathematics is strongly encouraged. All courses in the program expect a preparation of at least principles of economics and basic statistics. Students who lack some part of this preparation may be considered for admission conditional on their completing the appropriate undergraduate courses as non-matriculated students during the summer term before they begin the program in the fall.

Admission is competitive and highly selective.

In reviewing an applicant's credentials, the faculty will consider the following factors:

- **Prior Academic Accomplishments:** The faculty will examine all course work taken prior to application, paying particular attention to the specific courses that have been completed. Applicants should have attained a minimum grade point average of 3.0 (on a 4.0 scale) for all undergraduate course work completed. They also should have attained a minimum 3.3 average for any graduate-level course work taken. The faculty generally expects applicants to demonstrate a substantially higher level of accomplishment than these minimum requirements. A master's degree is not a requirement.
- **Graduate Record Examination (GRE):** Applicants are required to submit GRE scores. GRE scores are not accepted if they are more than five years old.
- **Test of English as a Foreign Language (TOEFL):** Applicants whose native language is not English and who have not already received a degree from a U.S. university must also submit scores from the Test of English as a Foreign Language (TOEFL).
- **Personal Statement/Essay:** Each applicant must submit a personal statement. The personal statement should explain the applicant's educational and personal experiences that have influenced the decision to pursue a PhD and should discuss the candidate's career plans and goals. The faculty are especially interested in learning about an applicant's prior research experience and the commitment to future research in the applicant's area of specialization.
- **Letters of Recommendation:** Two letters of recommendation must be submitted in support of the application. Applicants are strongly encouraged to seek recommendations from academics or other professionals who can assess the applicant's likelihood of success in a research-oriented PhD program.

Admission Procedures

The PhD Programs in Economics admits students each fall. To be considered for admission, the completed application must be received by the LeBow College of Business Office of Graduate Admissions no later than January 15th. It is the applicant's responsibility to ensure that all transcripts, test scores and letters of recommendation, as well as the application form and the personal statement, are received by Drexel University no later than January 15th.

Assistantships and Financial Aid

The LeBow College of Business strives to provide graduate assistantships to all entering PhD students. Each applicant to the PhD program is automatically considered for a graduate assistantship as well as for admission into the program. First-year graduate assistants are assigned to work with a faculty member on research activities. During the second and subsequent years, graduate assistants are generally assigned a combination of teaching and research responsibilities. Assistants receive a stipend and 27.0 credits of tuition remission per academic year. Doctoral students who are making satisfactory progress toward the degree can expect to be provided with an assistantship for at least four years.

Degree Requirements

The PhD in Economics program prepares economists for careers in research, teaching, business, and government. It is designed to provide students with not only a broad understanding of modern economics, but also the opportunity to conduct high quality research in a number of specific fields of study including industrial organization, international economics, and health economics.

In the second year of study, the PhD in Economics offers three fields of specialization: industrial organization, international trade, and open economy macroeconomics. Students complete courses in two of these fields of specialization.

Curriculum

60.0 credits (Post-Master's degree)
90.0 credits (Post-Bachelor's degree)

- 27.0 credits of first year core courses
- 18.0 credits of economics field requirements
- 15.0 credits (minimum) of dissertation research
- 30.0 additional dissertation research credits for students without a Master's degree

Core Program

All PhD students pursue a common set of core courses. The following courses are all completed during the first year, with the exception of ECON 942 Econometrics III, which is completed in the second year.

Core Courses

ECON 902	Mathematical Economics	3.0

ECON 910	Advanced Microeconomics I	3.0
ECON 911	Advanced Microeconomics II	3.0
ECON 920	Advanced Macroeconomics I	3.0
ECON 921	Advanced Macroeconomics II	3.0
ECON 940	Econometrics I	3.0
ECON 941	Econometrics II	3.0
ECON 942	Applied Microeconometrics [*]	3.0
ECON 980	Game Theory	3.0
STAT 931	Statistics for Economics	3.0
Total Credits		**30.0**

[*] Taken in the second year.

First-Year Examination

After the completion of the core coursework, students are examined on their competence in the core material and their readiness to proceed.

Fields of Specialization

Students are required to complete the coursework for at least two of the following fields/sequences.

Industrial Organization

ECON 950	Industrial Organization I
ECON 951	Industrial Organization II
ECON 959	Industrial Organization Seminar

International Trade

ECON 960	International Trade
ECON 961	Empirical International Trade
ECON 969	International Trade Seminar

Open Economy Macroeconomics

ECON 925	Macroeconomic Dynamics
ECON 962	Open Economy Macroeconomics
ECON 979	Open Economy Macro Seminar

Electives

In addition, students can take elective courses from the Economics Department, from any other departments in the College of Business, and from departments in other Colleges of Drexel University. The following is a set of sample electives:

ECON 930	Monetary Economics	3.0
ECON 952	Health Economics	3.0
ECON 955	Public Economics	3.0
ECON 964	Economic Development	3.0
ECON 990	Course ECON 990 Not Found	0.5-9.0
ECON 992	Course ECON 992 Not Found	3.0
Additional courses with the permission of the advisor		3.0
Dissertation Research		12.0
ECON 998	Dissertation Research in Economics	

Economics and International Business Faculty

Marco Airaudo, PhD *(University of Pennsylvania Philadelphia)*. Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.

Richard Barnett, PhD *(University of Minnesota)*. Associate Clinical Professor. Economic theory, macroeconomics.

Sebastien Bradley, PhD *(University of Michigan)*. Assistant Professor. Public finance, international economics.

Mian Dai, PhD *(Northwestern University)*. Assistant Professor. Managerial economics and strategy.

Pia DiGirolamo, PhD *(Purdue University)*. Assistant Clinical Professor. Macroeconomics, international finance.

Anne Duchene, PhD *(Ecole Nationale des Ponts et Chaussees, France) Department of Economics and International Business*. Assistant Professor. Microeconomics, industrial organization, law and economics.

Ramya Ghosh, PhD *(Claremont Graduate University)*. Assistant Clinical Professor. International economics.

Shawkat M. Hammoudeh, PhD *(University of Kansas) Department of Economics and International Business*. Professor. Applied econometrics, financial economics, international economics, natural resource economics.

Teresa D. Harrison, PhD *(University of Texas at Austin) Department of Economics and International Business*. Associate Professor. Econometrics, public finance, industrial organization, empirical microeconomics including health and nonprofit organizations.

Paul E. Jensen, PhD *(Penn State University) Associate Dean, College of Business*. Associate Professor. International trade. Primary research interest is international trade, particularly in empirical studies of international trade patterns.

Bang Nam Jeon, PhD *(Indiana University) Department of Economics and International Business*. Professor. Financial economics, world financial market linkages, foreign direct investment flows in the Asia-Pacific economies, the Korean economy: currency crisis, FDI, and macroeconomic issues, regional economic integration and newly industrializing economies: the

Stephen Joyce, MA *(Temple University) Department of Economics and International Business*. Assistant Clinical Professor. Education and human capital.

Christopher A. Laincz, PhD *(Duke University) Department of Economics and International Business*. Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Bijou Yang Lester, PhD *(University of Pennsylvania) Department of Economics and International Business*. Professor. Behavioral characteristics of shopping on-line, economic issues of electronic commerce, contingent employment and part-time work, the economy and suicide.

Vibhas Madan, PhD *(Michigan State University) Head of the Department of Economics and International Business.* Professor. International trade theory, applied microeconomics.

Roger A. McCain, PhD *(Louisiana State University) Department of Economics and International Business.* Professor. Computational economics, game theory.

Irina Murtazashvili, PhD *(Michigan state University).* Assistant Professor. Applied econometrics.

Maria Olivero, PhD *(Duke University) Department of Economics and International Business.* Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA *(American University) Department of Economics and International Business.* Clinical Associate Professor. Macroeconomics, political economy.

Konstantinos Serfes, PhD *(University of Illinois at Champaign-Urbana) Department of Economics and International Business.* Associate Professor. Industrial organization; microeconomics.

Mark Stehr, PhD *(University of California at Berkeley) Department of Economics and International Business.* Associate Professor. Health Economics, public finance, public policy.

Constantinos Syropoulos, PhD *(Yale University) Trustee Professor of International Economics, Department of Economics and International Business.* Professor. International trade, political economy, applied microeconomics.

Matthew Weinberg, PhD *(Princeton University).* Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Yoto Yotov, PhD *(Boston College).* Associate Professor. International trade, applied microeconomics, political economy.

Interdepartmental Faculty

Bruce D. McCullough, PhD *(University of Texas) Department of Decision Sciences.* Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Emeritus Faculty

Edward C. Koziara, PhD *(University of Wisconsin) Department of Economics and International Business.* Professor Emeritus. Applied micro and macro economics.

Andrew G. Verzilli, PhD *(Boston College).* Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Chiou-shuang Yan, PhD *(Purdue University).* Professor Emeritus. International economics, input-output analysis.

LeBow College of Business: School of Economics

Economics is one of Drexel LeBow's strongest disciplines. The LeBow College of Business celebrated its strengths in economics teaching and research by elevating its economics department into a School of Economics in September 2013. The School of Economics will continue Drexel LeBow's commitment to offering a curriculum that is current and challenging, and to conducting research that aligns with business trends and informs policy makers.

Economics is at the root of business decisions, (http://catalog.drexel.edu/) government policy making and global relations. As a course of study, (http://catalog.drexel.edu/) it can lead to diverse career opportunities. A degree in economics provides students with a robust understanding of the workings of the market system and major economic institutions, (http://catalog.drexel.edu/) economic policy, (http://catalog.drexel.edu/) and development. The Economics Department boasts an award-winning group of faculty members who are leading researchers and dedicated teachers. The world-renowned faculty members take a hands-on approach to teaching, (http://catalog.drexel.edu/) research and mentoring students.

Majors

- Economics (MS) (p. 225)
- Economics (PhD) (p. 227)

The Antoinette Westphal College of Media Arts and Design

About the College

The Antoinette Westphal College of Media Arts & Design (The Westphal College) offers graduate programs in Arts Administration, Fashion Design, Interior Architecture & Design, Digital Media, Museum Leadership, and Television Management. The programs are distinctive in content and professionally oriented.

The Westphal College is a community of learning within the areas of media, design, the fine arts, the performing arts, and the management of creative enterprise that values experiential and immersive education; it is a place where students are encouraged to give form to ideas by learning to negotiate change in an ever-changing world. Through creative, critical, and collaborative approaches, the Westphal College's diverse programs seek to foster innovation and leadership in progressively interconnected professional disciplines and areas of study.

The academic programs are rigorous, and provide the appropriate balance of a solid foundation with individual creative direction, cultural awareness, strong technical skills, and an understanding of management and professional practice. The College is committed to a continual review of our curricula, processes and outcomes in order make those improvements and refinements necessary to further enrich our students' education, and to continue to foster independent thinkers, astute leaders, and creative problem solvers.

Majors

- Arts Administration (MS) (p. 231)
- Digital Media (MS, PhD) (p. 233)
- Fashion Design (MS) (p. 237)
- Interior Architecture & Design (MS) (p. 240)
- Museum Leadership (MS) (p. 243)
- Television Management (MS and MS/MBA) (p. 245)

Full/Part-Time Options

- Graduate study in and digital media, fashion design, interior architecture + design includes two years of full-time graduate study. There are some programs that require pre-requisite coursework before entering into the graduate level studies.
- Students may enroll in the arts administration program on a full-time or part-time basis. Full-time arts administration students may complete the degree in five terms. The arts administration graduate program is also available as a fully-online degree through Drexel University Online.
- Students may enroll in the Paul F. Harron Graduate Program in Television Management program on a full-time or part-time basis. Television management students enrolled full-time in either option should plan to take two full years to complete the program.

Facilities

Designed to be an incubator for tomorrow's creative leaders, The URBN Center is the award-winning home for many of the programs in the Antoinette Westphal College of Media Arts & Design, providing students with rigorous, studio intensive instruction with the latest technological resources. Majors that share this space include Animation & Visual Effects, Architecture, Design & Merchandising, Entertainment & Arts Management, Fashion Design, Game Design & Production, Graphic Design, Interactive Digital Media, Interior Design, Music Industry and Product Design.

The URBN Center also provides a black box theater for our Theatre program, a 3,500 square foot Leonard Pearlstein Gallery, two MIDI labs and MAD Dragon Records Suite, a Motion Capture studio, a Hybrid Making Lab featuring Universal Laser Cutters and 3D printing and prototyping, the Robert and Penny Fox Historic Costume Collection (http://www.drexel.edu/westphal/resources/FHCC), the Charles Evans Fashion Design Library, a multi-use screening & lecture room, and offices for the College's administrative functions.

The Paul Peck Problem Solving & Research Building is home to our Photography major and Department of Art & Art History. Within this facility, the Westphal College occupies a 10,000- square-foot photography lab, lighting studios, two digital imaging labs, as well as six lecture/laboratory spaces for our Visual Studies courses.

In University Crossings, a 25,000 square foot space houses offices for Film & Video, Screenwriting & Playwriting and Television faculty. Also in this building are two state-of-the-art digital editing facilities, a shooting studio with special effects capability, two screening rooms, a digital audio post production studio, several multi-media classrooms, and a well-stocked equipment room.

MacAlister Hall serves students in the Westphal College with: digital audio labs and recording studios for Music Industry; The Mandell Theater (http://www.drexel.edu/westphal/resources/MandellTheater), a 420-seat proscenium theater with scene shop and dressing rooms; the Ellen Forman Memorial Dance Studio; and a high-definition studio space for our college-operated television station, DUTV, which reaches over 400,000 households.

Arts Administration

Major: Arts Administration
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 50.1002
Standard Occupational Classification (SOC) code: 13-1011

About the Program

The MS in Arts Administration program is designed to provide academic preparation for leadership positions with nonprofit organizations, foundations, corporations, and government agencies involved in the arts and culture sector.

Students may enroll in the program on a full- or part-time basis. The program is designed to accommodate working students, so all classes are offered in the evening or online. Students must matriculate in either the campus or online program, but students in either program may take some courses in the other program.

Students should plan to enter the program at the start of the fall term. Full-time arts administration students may complete the degree in five consecutive terms when beginning in the fall term, and part-time students typically take seven to eight terms to complete the degree.

Professional Opportunities

Graduates of the program serve in various administrative capacities with museums, galleries, historical societies, government agencies, performing arts organizations, arts centers, and philanthropic and corporate foundations.

Admission Requirements

Requirements for Admission

In addition to meeting the general requirements for admission to graduate studies, applicants should present a résumé demonstrating a strong affinity for the field through work, volunteer experiences, education, or special training. Undergraduate preparation must include at least one course in financial accounting, two courses in the history or literature of an art form, and/or two courses in the practical or creative aspects of an art. Applicants who lack this preparation (or the equivalent) must complete work in the above areas during the first two terms in the program.

An important part of the admissions process is a personal interview with the Program Director. Potential applicants will be contacted to schedule an interview through the Department of Arts & Entertainment Enterprise 215.895.2453 once the application is processed through Graduate Admissions.

Financial Assistance

A limited number of assistantships are available to students in the campus program. Students should have experience in gallery management, public relations or newsletter writing/editing, and should indicate their interest in these positions in their initial letters of inquiry. Students are also encouraged to explore other assistantships available across the University. In the past, arts administration students have held positions in the honors program, the Greek Life Office, the Leadership Program, and the College of Evening and Professional Studies. Awards are made annually on a competitive basis.

Students in the online program only may qualify for a tuition discount through Drexel's partnership with Americans for the Arts.

Dean's Fellowship

In addition to teaching and research assistantships, the College of Arts and Sciences also awards 10 Dean's Fellowships per year to full-time students in the campus program. These highly competitive awards are granted across the College, and come with a $5,000 stipend supplement for each of the first two years of study in addition to any other support a student receives.

For additional information on requirements and how to apply, visit Graduate Admissions (http://www.drexel.edu/grad/programs/westphal/arts-administration) at Drexel University.

Degree Requirements

Each student is assisted with the planning and completion of a program of study in accordance with the student's needs and career goals. Each candidate for the MS in arts administration must complete 45 credits, including courses in cultural policy, management skills, and fund development. To enable the student to tailor the program of study to meet his or her career goals, a variety of electives are offered. Students may identify tracks in marketing, fund development, finance, or research through their selection of electives.

Many of our students work in an appropriate related arts job associated with a professional arts organization. After completing all core courses, some students choose to complete an internship within the arts and cultural community. The student's thesis grows out of the internship experience or can address a research topic that the student chooses to explore further.

Curriculum

Professional Requirements

AADM 505	Overview Of Arts Administration	3.0
AADM 510	Writing for the Arts	3.0
AADM 610	Financial Accounting for Non-Profit Arts Organizations	3.0
AADM 620	Law and the Arts	3.0
AADM 650	Fund Development for the Arts	3.0
AADM 670	Audience Development	3.0
AADM 710	Strategic Planning and Evaluation	3.0
AADM 750	Arts Administration Seminar	3.0
AADM 751	Management Techniques In the Arts	3.0
AADM 770	Technology and the Marketing of the Arts	3.0
AADM 798	Thesis Development	1.5
AADM 799	Thesis Completion	1.5
Electives [*]		12.0

Sample Elective Offerings

AADM 660	International Cultural Policy	
AADM 680	Trends in Fund Development	
AADM 720	Leadership in the Arts	
AADM 731	Human Resources Management in the Arts	
AADM 740	Production Laboratory in the Arts	
AADM 752	Performing Arts Management	
AADM 753	Visual Arts Organization Management	
AADM 755	Community Cultural Planning	
AADM 757	Political Activism in the Arts	
AADM 760	Special Problems in Arts Management	
AADM 775	Technology Management in the Arts	
HRMT 622	Human Resource Administration	
MGMT 680	Leading for Innovation	
VSST 501	Contemporary Art Issues	

Total Credits		**45.0**

[*]   All Business electives must be approved by advisor and require registration through the MBA office.
Additional Electives not on the pre-approved list must be at the 600 level or above and require advisor approval.

Arts & Entertainment Enterprise Faculty

Xela Batchelder, PhD *(Ohio State University).* Assistant Professor. Entertainment and arts management; theater management, touring, presenting and booking.

Jean Brody, DFA *(Yale School of Drama) Program Director, Online MS in Arts Administration.* Associate Teaching Professor. Arts administration.

Lawrence Epstein, MBA *(Cornell University) Interim Department Head, Arts & Entertainment Enterprise.* Associate Teaching Professor.

Julie Goodman Hawkins, MFA *(Temple University) Program Director, MS in Arts Administration.* Assistant Professor. Cultural policy, political activism in the arts, changes in economic and social policy, arts sector changes.

James L. Klein, BA *(Oberlin College).* Associate Professor. Music technologist, sound and recording engineer, songwriter for film, TV and radio music.

Michelle Manghise, BS *(St. John's University).* Assistant Teaching Professor. 25-year veteran of music industry; music publishing, copyright, artist management, entrepreneurship, entertainment marketing.

Brian Moore, MS, MFA *(Drexel University; Louisiana State University) Program Director, BS in Entertainment and Arts Management.* Assistant Teaching Professor. Nonprofit organizations: fund development; strategic planning; communications and marketing; and executive management.

John Seay, BMus *(James Madison University).* Associate Professor. Sound and recording engineer, music technologist, music producer and studio technician.

Cyrille Taillandier Associate Teaching Professor. Recording engineer, music producer and digital editor.

Neville Vakharia, MS *(Drexel University) Research Director.* Assistant Professor. Technology in the arts, strategic planning and evaluation, management and leadership, innovation and entrepreneurship.

Darren Walters, BA *(University of Delaware).* Associate Teaching Professor. General Manager of Mad Dragon Records and co-owner and President of Jade Tree, an independent record label.

Andrew Zitcer, MCP *(University of Pennsylvania).* Assistant Teaching Professor. Arts and community development, community based organizations, governance modes, organizational planning, narrative and social theory.

Digital Media

Major: Digital Media
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD, post-bachelor's); or 45.0 (PhD, post-master's)
Classification of Instructional Programs (CIP) code: 11.0801
Standard Occupational Classification (SOC) code: 27-1027

About the Program

Digital Media is an exciting and rapidly expanding hybrid field of research, study and practice. Over the past two decades, it has grown from a highly specialized activity to an approachable subject that sparks global attention in areas of entertainment, business, engineering and health care.

Master of Science Program

The MS in Digital Media is a hybrid program created to offer students research as well as career opportunities in 21st century media

applications. This two-year program offers comprehensive studies in advanced digital design including 3D modeling, animation, interactivity, gaming and digital media history, theory and methods. The curriculum for the MS in Digital Media offers a mix of academic course work and project-related activities. Projects consist of funded grant research opportunities, industry-sponsored projects and independent, student-generated and faculty-approved projects.

PhD Program

The Digital Media PhD program focuses on translational research in digital media within an experiential learning environment. It studies the application of digital media towards solving research problems in various disciplines including but not limited to engineering, education, cultural heritage, health or business. This doctoral program is built on a fundamentally interdisciplinary course structure and emphasizes an iterative and design based research philosophy.

For more information, visit Drexel's Graduate Studies in Digital Media (http://www.drexel.edu/westphal/graduate/DIGM) web page.

Admission Requirements

Master of Science Program

The MS in Digital Media is an advance course of study. A successful applicant for admission will have a baccalaureate degree, a minimum 3.2 undergraduate GPA and assumed production skills in 3-D modeling, animation and interactivity.

Proof of basic competencies is demonstrated by undergraduate transcript and/or portfolio review. For qualified candidates lacking production skills, we offer a series of pre-graduate classes. Satisfactory completion of the classes qualifies one to apply for graduate admission. Pre-graduate classes may include some or all for the following:

CS 171	Computer Programming I	3.0
CS 172	Computer Programming II	3.0
DIGM 100	Digital Design Tools	3.0
DIGM 505	Design and Interactivity	3.0
DIGM 506	Animation and Game Design	3.0

For additional information on requirements and how to apply, visit Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/westphal).

MS in Digital Media

Degree Requirements

Students are required to take a Digital Media History, Theory and Methods course and an advanced seminar for a total of six credits, as well as a minimum of nine courses in advanced modeling animation and interactivity.

During the first year, students also take three New Media Project courses (9.0 credits); these courses provide opportunities to work on funded and unfunded research and industry projects under the guidance of a graduate faculty member. With faculty approval, students may also work on personally designed projects relevant to problem solving in a student's specific area of interest.

In addition, students are required to take 12.0 credits (a minimum of four courses) of directed studies in support of developing knowledge in an area—outside of media and design—to which digital media skills may be

applied. The set of directed studies will be determined by the students and their graduate advisors. Possible areas for this focus include, but are not limited to, computer science, information science, bio-medical technology, social science, humanities and education.

Thesis Project

During the second year of study, each student develops and produces a master's thesis project. By the third week of the fall term students submit a proposal to the Digital Media Graduate Committee. Upon approval of the proposal, the student works toward thesis completion, including:

- an oral presentation to the college
- a written statement to the committee
- a copy of the completed media work for the graduate program archive

The thesis project must demonstrate domain knowledge of the agreed upon classes. The media component of the project must demonstrate expertise in 3D modeling/animation and/or interactivity.

Prerequisite Courses

Students without adequate background in digital media are required to take the following prerequisite courses, which are offered during the summer term. These courses do not count towards the MS in Digital Media degree requirements.

DIGM 505	Design and Interactivity	3.0
DIGM 506	Animation and Game Design	3.0
Total Credits		**6.0**

Required Courses

DIGM 501	New Media: History, Theory and Methods	3.0
DIGM 520	Advanced Interactivity I	3.0
DIGM 521	Advanced Interactivity II	3.0
DIGM 525	Advanced Animation I	3.0
DIGM 526	Advanced Animation II	3.0
DIGM 530	Advanced Game Design I	3.0
DIGM 531	Advanced Game Design II	3.0
DIGM 540	New Media Project	6.0
DIGM 580	Thesis Preparation	3.0
Thesis		
DIGM 680	Thesis Development	6.0
Directed Studies		9.0
Total Credits		**45.0**

Program Requirements Overview

Students applying for admission into the Digital Media PhD program are either post-baccalaureate or post-master's students. Those who are post-master's are required to take a minimum of 45.0 credits toward their PhD degree (Research Core). Post-baccalaureate PhD students are required to take a minimum of 90.0 credits (45.0 credits Digital Media Core, and 45.0 credits Research Core).

Prerequisite Courses

Post-baccalaureate PhD students without adequate background in digital media are required to take the following prerequisite courses, which are offered during the summer term. These courses do not count towards the Digital Media degree requirements.

DIGM 505	Design and Interactivity	3.0
DIGM 506	Animation and Game Design	3.0
Total Credits		**6.0**

Digital Media Core Courses

DIGM 501	New Media: History, Theory and Methods	3.0
DIGM 520	Advanced Interactivity I	3.0
DIGM 521	Advanced Interactivity II	3.0
DIGM 525	Advanced Animation I	3.0
DIGM 526	Advanced Animation II	3.0
DIGM 530	Advanced Game Design I	3.0
DIGM 531	Advanced Game Design II	3.0
DIGM 540	New Media Project	6.0
DIGM 580	Thesis Preparation	3.0
DIGM 680	Thesis Development	6.0
Directed Study		9.0
Total Credits		**45.0**

Research Core Courses

DIGM 701	Advanced New Media Topics	3.0
DIGM 710	Digital Media Research Methods I	3.0
DIGM 711	Digital Media Research Methods II	3.0
DIGM 810	Advanced Topics in Digital Media Research	3.0
DIGM 850	Public Venue Seminar	3.0
DIGM 851	Publication and Presentation	3.0
Dissertation		
DIGM 998	Digital Media Ph.D. Seminar	9.0
Directed Research		18.0
Total Credits		**45.0**

In addition to the course requirements, PhD students must progress through a series of steps leading to the PhD dissertation:

1. Doctoral candidacy exam
2. Dissertation proposal
3. Written dissertation and public dissertation defense

Dissertation Advisor

Every PhD student has to identify a dissertation advisor no later than the second term in the program. Post-master's students are expected to identify an advisor as soon as possible after joining the program or even before they are formally in the program. The expectation is that post-master's students are academically mature and have already focused on a research area and contacted potential advisors prior to their arrival. Dissertation advisors are not restricted to digital media faculty, but have to be approved by the Department of Digital Media under observation of college and university rules and regulations.

Directed Research Electives

Digital Media PhD students are required to take 18.0 PhD level credits of directed research electives, which have to be approved in advance by the dissertation advisor. It is expected that students take at least 9.0 of these elective credits from other Drexel colleges outside the Antoinette Westphal College of Media Arts in Design in areas closely related to

their respective dissertation projects. No more than 12.0 of the elective research credits can be independent study credits.

Doctoral Candidacy Committee

The Department of Digital Media has to establish a Doctoral Candidacy Committee conforming to established university and college rules for dissertation/candidacy committee membership. The purpose of this committee is to conduct and evaluate doctoral candidacy examinations.

Doctoral Candidacy Exam

The Doctoral Candidacy Exam consists of a preliminary proposal prepared by the student outlining the dissertation research plan with an oral defense before the Doctoral Candidacy Committee. A student may schedule the preliminary proposal portion whenever she/he and her/his advisor decide they are ready but no later than the end of the fall term of second year of study.

To be considered a doctoral candidate by the university, a student must have both passed the Doctoral Candidacy Exam and completed all 45.0 credits of master level coursework post-baccalaureate or 15 credits coursework post-master. Once the student has reached doctoral candidate status, the Department of Digital Media will review her/his progress annually.

Dissertation Committee

Within six months of successful completion of the Doctoral Candidacy Examination the Department of Digital Media has to appoint the student's Dissertation Committee based on a proposal submitted by the student and the dissertation advisor. The committee has to conform to established university and college rules for dissertation/candidacy committee membership. The committee must have at least five members, three of whom must be tenure-track faculty at Drexel. At least one member must be from outside the Antoinette Westphal College of Media Arts and Design. In addition, at least three members must be Digital Media core faculty. The chair of the committee must be a Digital Media core faculty member who is not also the dissertation advisor of the student.

Once the Dissertation Committee is established, it will continue on throughout the student's progress toward the PhD degree. The committee's function is to guide the research and to determine the student's general knowledge of the area, as well as the student's breadth and depth of the specific topic. The committee will also consider the scientific feasibility of the proposed research.

Dissertation Proposal

The Dissertation Proposal consists of a written proposal of the dissertation research, a public presentation, and oral proposal defense before the Dissertation Committee. To ensure that students are progressing towards completion of the PhD in a timely fashion, the proposal defense must take place no later than the end of the second year of study. A formal request for an extension of this deadline must be approved following a review of the student's progress.

The purpose of the Dissertation Proposal is to determine if the PhD student is able to initiate, organize, write and defend a scientific idea, which will lead to a PhD dissertation. The presentation will be based on the formal written proposal submitted to the Dissertation Committee at least three weeks before the presentation.

Students who elect to complete the MS in Digital Media alongside the Digital Media PhD degree can submit a revised version of the Dissertation Proposal as a Master Thesis for the partial fulfillment of the MS in Digital Media degree.

Dissertation Defense

The written dissertation will be submitted with the dissertation advisor's approval to the Dissertation Committee. A title and abstract of the dissertation must also be provided to the Digital Media office at least three weeks prior to the defense to allow the time and place of the defense to be publicized. The PhD candidate's public defense consists of his or her presentation of dissertation research followed by an examination by the Dissertation Committee.

Sample Plan of Study

Students without adequate background in digital media must complete two prerequisite courses in the summer, prior to beginning the graduate program: DIGM 505 Design and Interactivity and DIGM 506 Animation and Game Design.

First Year

Fall		Credits
DIGM 501	New Media: History, Theory and Methods	3.0
DIGM 520	Advanced Interactivity I	3.0
DIGM 525	Advanced Animation I	3.0
	Term Credits	**9.0**
Winter		
DIGM 526	Advanced Animation II	3.0
DIGM 530	Advanced Game Design I	3.0
DIGM 540	New Media Project	3.0
	Term Credits	**9.0**
Spring		
DIGM 521	Advanced Interactivity II	3.0
DIGM 531	Advanced Game Design II	3.0
DIGM 540	New Media Project	3.0
	Term Credits	**9.0**
Summer		
Directed Elective		3.0
	Term Credits	**3.0**
Second Year		
Fall		
DIGM 580	Thesis Preparation	3.0
Directed Elective		3.0
	Term Credits	**6.0**
Winter		
DIGM 680	Thesis Development	3.0
Directed Elective		3.0
	Term Credits	**6.0**
Spring		
DIGM 680	Thesis Development	3.0
	Term Credits	**3.0**

Total Credit: 45.0

Sample Plan of Study for Post-Baccalaureate PhD Students

Students without adequate background in digital media must complete two prerequisite courses in the summer, prior to beginning the graduate program: DIGM 505 Design and Interactivity and DIGM 506 Animation and Game Design .

First Year

Fall		Credits
DIGM 501	New Media: History, Theory and Methods	3.0
DIGM 520	Advanced Interactivity I	3.0
DIGM 525	Advanced Animation I	3.0
	Term Credits	**9.0**
Winter		
DIGM 526	Advanced Animation II	3.0
DIGM 530	Advanced Game Design I	3.0
DIGM 540	New Media Project	3.0
	Term Credits	**9.0**
Spring		
DIGM 521	Advanced Interactivity II	3.0
DIGM 531	Advanced Game Design II	3.0
DIGM 540	New Media Project	3.0
	Term Credits	**9.0**
Summer		
DIGM 850	Public Venue Seminar	3.0
Directed Elective		3.0
	Term Credits	**6.0**

Second Year

Fall		
DIGM 580	Thesis Preparation	3.0
DIGM 710	Digital Media Research Methods I	3.0
	Term Credits	**6.0**
Winter		
DIGM 680	Thesis Development	3.0
DIGM 711	Digital Media Research Methods II	3.0
	Term Credits	**6.0**
Spring		
DIGM 680	Thesis Development	3.0
Directed Elective		3.0
	Term Credits	**6.0**
Summer		
DIGM 701	Advanced New Media Topics	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Elective		3.0
	Term Credits	**7.0**

Third Year

Fall		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Winter		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Spring		
DIGM 851	Publication and Presentation	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**7.0**
Summer		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**

Fourth Year

Fall		
DIGM 810	Advanced Topics in Digital Media Research	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
	Term Credits	**4.0**
Winter		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Spring		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Summer		
DIGM 998	Digital Media Ph.D. Seminar	1.0
	Term Credits	**1.0**

Total Credit: 90.0

Sample Plan of Study for Post-Master Ph.D. Students

First Year

Fall		Credits
DIGM 710	Digital Media Research Methods I	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
	Term Credits	**4.0**
Winter		
DIGM 711	Digital Media Research Methods II	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
	Term Credits	**4.0**
Spring		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Summer		
DIGM 701	Advanced New Media Topics	3.0
	Term Credits	**3.0**

Second Year

Fall		
DIGM 998	Digital Media Ph.D. Seminar	1.0

Directed Research Elective		3.0
	Term Credits	**4.0**
Winter		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Spring		
DIGM 851	Publication and Presentation	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**7.0**
Summer		
DIGM 850	Public Venue Seminar	3.0
Directed Research Elective		3.0
	Term Credits	**6.0**
Third Year		
Fall		
DIGM 810	Advanced Topics in Digital Media Research	3.0
DIGM 998	Digital Media Ph.D. Seminar	1.0
	Term Credits	**4.0**
Winter		
DIGM 998	Digital Media Ph.D. Seminar	1.0
Directed Research Elective		3.0
	Term Credits	**4.0**
Spring		
DIGM 998	Digital Media Ph.D. Seminar	1.0
	Term Credits	**1.0**

Total Credit: 45.0

Facilities

The Digital Media Program operates several labs including a state of the art combined green screen/motion capture studio as well as 2.5 ton 3-degree-of-freedom motion platform. All labs and classrooms are equipped with powerful Dell and Boxx Technologies Workstations running Windows and Unix operating systems and Mac computers running OS X. Software includes a host of Adobe products and Autodesk 3ds Max and Combustion; Alias Maya; Softimage XSI and Behavior, Pixar RenderMan Pro Server along with RenderMan Artist Tools for Maya and RenderMan for Maya; Pixologic Z-Brush; Apple Shake; MotionBuilder; GarageGames; NextLimit RealFlow, and SideEffect's Houdini.

Digital Media Faculty

Frank J. Lee, PhD *(Carnegie Mellon University)*. Associate Professor. Human-computer interaction; cognitive engineering and science; intelligent software agents for games and education.

Interdepartmental Faculty

Ted Artz, BFA *(Tyler School of Art, Temple University)*. Associate Professor. Digital media.

Paul Diefenbach, PhD *(University of Pennsylvania) Associate Program Director, Game Art & Production*. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA *(Pennsylvania State University)*. Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS *(Drexel University) Associate Program Director, Interactive Digital Media.* Assistant Teaching Professor. Advertising, design and interactivity.

Nick Jushchyshyn, MFA *(Academy of Art University) Associate Program Director, Animation and Visual Effects.* Visual effects, digital media and animation.

David Mauriello, BA *(Lafayette College)*. Assistant Professor. 3D modeling and animation.

Glen Muschio, PhD *(Temple University)*. Associate Professor. Digital media, society, communication.

Jervis Thompson, BS *(Drexel University)*. Associate Teaching Professor. Digital media, interactive multimedia.

Michael Wagner, PhD *(Vienna University of Technology) Program Director, Digital Media*. Associate Professor. Educational use of digital media and computer games.

Jichen Zhu, PhD *(Georgia Institute of Technology)*. Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Fashion Design

Major: Fashion Design
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 63.0
Classification of Instructional Programs (CIP) code: 50.0407
Standard Occupational Classification (SOC) code: 27-1022

About the Program

The MS in Fashion Design is a full-time program that stresses the development of the aesthetic and philosophical concepts of fashion design and the technical skills to support research and experimentation in these concepts. A typical graduate sequence may consist of seven terms of graduate courses and five terms of prerequisite coursework, beginning with the summer term accelerated design and drawing courses.

The goal of the MS program in fashion design is to integrate the understanding of design with the construction of clothing so that the final products answer physical, aesthetic, psychological, and social needs within the context of contemporary fashion and industrial limitations. The curriculum is structured so that studio, laboratory, and classroom work give the graduate student a directed experience in the study of aesthetics, criticism, and contemporary art concepts; contemporary and historic art and design; traditional and current fashion technology; the discipline of drawing; and the making of art. A required industry internship affords the graduate student direct experience in a workplace of their choice.This comprehensive approach provides the basis for a broad range of employment in the fashion industry and in education. Other professional opportunities lie in merchandising, costume design, curatorial work, and computer-aided design.

The faculty of the Department of Design includes art historians, CAD specialists, designers, fiber artists, merchandising specialists, new materials and processes researchers, painters, and sculptors. The department also draws on practicing professionals as adjunct professors for specialized coursework and for critique of student work.

A limited number of graduate assistantships are available to students after completing the first year.

The Fashion and Design & Merchandising programs produce a professionally juried annual fashion show which provides competitive fashion industry and department awards and excellent exposure for the graduate students' design thesis. Drexel students can participate in the activities of the Fashion Group of Philadelphia, the local chapter of an international fashion industry organization. Students may also join the Fashion and Design Student Organization and attend trips to fashion events in New York City.

The 63.0 graduate quarter credits does not include any of the required prerequisite coursework. See the Admission Requirements for a list of courses students are expected to have completed prior to beginning their graduate study.

Additional Information

For more information about this program, please contact the Program Director:
Kathi Martin
martink@drexel.edu

Admission Requirements

Students enter the program from diverse backgrounds, including liberal arts, fine arts, and business. A personal interview is required. The admission criteria for the graduate program consist of the requirements of the University for graduate admission plus satisfaction of undergraduate coursework in basic fashion design skills and concepts. These prerequisites comprise 24.0 credits in design, drawing, and art history in addition to 20.0 credits in specific undergraduate fashion design professional courses, or their equivalent.

Prerequisite Undergraduate Coursework

ARTH 335 [WI (p. 237)]	History of Costume I: Preclassical to Directoire	3.0
ARTH 336 [WI (p. 237)]	History of Costume II: Directoire to World War I	3.0
FASH 201	Survey of the Fashion Industry	3.0
FASH 210	Presentation Techniques in Fashion	3.0
FASH 211	Fashion Drawing I	3.0
FASH 212	Fashion Drawing II	3.0
FASH 230	Textiles for Fashion Design	3.0
FASH 241	Construction Skills	4.0
FASH 251	Fashion Design I	4.0
FASH 341	Flat Pattern Design	4.0
FASH 342	Draping Design	4.0
FASH 343	Tailoring and Design	4.0
VSST 104	Accelerated Design I *	2.0
VSST 105	Accelerated Design II *	2.0
VSST 106	Accelerated Design III *	2.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0
VSST 204	Materials Exploration	4.0
Select two of the following:		6.0
ARTH 101	History of Art I: Ancient to Medieval	
ARTH 102	History of Art II: High Renaissance to Modern	
ARTH 103	History of Art: Early to Late Modern	
Total Credits		**63.0**

* Or VSST 101, VSST 102, VSST 103 (Design I, II, III; 12.0 credits).

Beginning in the summer term, the department offers a four-term prerequisite year to prepare candidates for the graduate coursework. A portfolio review and departmental evaluation determine what prerequisites have been satisfied. Contact the graduate advisor for specific information about prerequisites or to make an appointment for evaluation.

For additional information on requirements and how to apply, visit Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/westphal).

Degree Requirements

The two years of full-time graduate coursework combine four terms of faculty-directed studio work in fashion design and two terms of student-directed independent studio work with required courses in design, aesthetics, and the art process. Elective coursework in fashion or specific topics; advanced studies in art, computer-aided design, art history, and fashion design; and independent studies allow individual flexibility in curriculum design.

Graduate Problems in Fashion Design I and II (FASH 865 and FASH 866) emphasize the development of an original statement of design intent, allowing students to synthesize their academic experiences and prepare for the marketplace. Each graduate student develops his or her personal collection which is then produced and presented in a professional fashion show.
Professional Portfolio (FASH 864) is a capstone course in which students create a professional quality collection of drawings geared to their market preferences.

Students are required to participate in at least three national and international fashion design competitions (FASH 899). These competitions provide awareness of world-wide design sensibilities and the overall level of competition in various facets of the marketplace.

The fashion industry internship (FASH 600) promotes spirit of entrepreneurship and provides perspective on success in the fashion industry. A full-time ten week position in industry is required and provides experience in design and production processes.

Required Courses

Fashion Design Studios		
ARTH 530	History of Modern Design	3.0
FASH 600	Fashion Industry Internship	0.0
FASH 604	Materials Exploration	3.0
FASH 610	Presentation Techniques	3.0
FASH 611	Textile Design	3.0
FASH 615	Computer Aided Design for Patternmaking	3.0
FASH 616	Computer Aided Design for Fashion Design	3.0
FASH 628	Draping Design	3.0

FASH 629	Fashion Design I	3.0
FASH 630	Fashion Design A	3.0
FASH 631	Fashion Design B	3.0
FASH 632	Drawing for Industry	3.0
FASH 643	Tailoring	3.0
FASH 730	Fashion Design C	3.0
FASH 731	Fashion Design D	3.0
FASH 765	Fashion Presentation	3.0
FASH 766	Fashion Business Topics	3.0
FASH 864	Professional Portfolio	3.0
FASH 865	Problems in Fashion Design Phase I	3.0
FASH 866	Problems in Fashion Design Phase II	3.0
FASH 899	Comprehensive Examination in Fashion Design	0.0
Select two of the following:		6.0
FASH 617	Technical Design	
FASH 625	Principles of Flat Pattern and Draping	
FASH 750	Machine Knitting	
FASH 751	Accessory Design	
FASH 752	Millinery Design	
FASH 754	Advanced Fashion Drawing	
FASH 767	Style and the Media	
FASH 799	Special Topics in Fashion Design	
Total Credits		**63.0**

Sample Plan of Study

Term 1		Credits
FASH 604	Materials Exploration	3.0
	Term Credits	**3.0**
Term 2		
FASH 610	Presentation Techniques	3.0
FASH 628	Draping Design	3.0
	Term Credits	**6.0**
Term 3		
FASH 629	Fashion Design I	3.0
	Term Credits	**3.0**
Term 4		
FASH 630	Fashion Design A	3.0
FASH 632	Drawing for Industry	3.0
Elective		3.0
	Term Credits	**9.0**
Term 5		
FASH 611	Textile Design	3.0
FASH 643	Tailoring	3.0
FASH 765	Fashion Presentation	3.0
	Term Credits	**9.0**
Term 6		
ARTH 530	History of Modern Design	3.0
FASH 616	Computer Aided Design for Fashion Design	3.0
FASH 631	Fashion Design B	3.0
	Term Credits	**9.0**

Term 7		
FASH 730	Fashion Design C	3.0
FASH 766	Fashion Business Topics	3.0
FASH 864	Professional Portfolio	3.0
	Term Credits	**9.0**
Term 8		
FASH 615	Computer Aided Design for Patternmaking	3.0
FASH 731	Fashion Design D	3.0
FASH 865	Problems in Fashion Design Phase I	3.0
	Term Credits	**9.0**
Term 9		
FASH 866	Problems in Fashion Design Phase II	3.0
FASH 899	Comprehensive Examination in Fashion Design	0.0
Elective		3.0
	Term Credits	**6.0**

Total Credit: 63.0

Facilities

The open design of the URBN Center studio spaces fosters collaboration across our diverse design, media and art disciplines. It provides spaces where students can see what their classmates are creating; where making labs can be shared by students from many majors; and where creative connections can be made.

All majors in the college integrate use of discipline-specific and general use software in the 35 computer labs at Drexel's Westphal College of Media Arts & Design which house over 550 computers (Apple iMacs, Apple MacPros, BoxxTech, Dell, and HP). Also available within our college are five premier Music Industry recording studios and a motion capture/green screen compositing space. The Hybrid Lab contains traditional metal and woodworking machines as well as a rapid prototyper, a laser cutter, and access to a 3D router for multi-disciplinary design and product making. In The Shima Seiki Haute Technology Laboratory students experiment with production methods that advance the field of wearable technology using sixteen SDS-ONE APEX3 workstations, three state-of-the-art knitting machines.

The Robert and Penny Fox Historic Costume Collection (http://www.drexel.edu/westphal/resources/FHCC) (FHCC), one of the finest teaching collections in the United States, is an educational resource for the students of Drexel University. Our mission as a University-based collection is to educate and inspire, while providing a significant resource for an ever-expanding community of historians, scholars, artists, and designers. Westphal College's new URBN Center facility has greatly improved the accessibility and visibility of the FHCC and allowed us to honor A. J. Drexel's original educational intent in taking a leadership role in research and scholarship, while preserving the collection for future generations. The Charles Evans Library contains books, periodicals, DVDs and other sources of inspiration for the fashion student.

The fourth floor of the Academic Building is occupied by a 10,000-square-foot photography lab, lighting studios, and two digital imaging labs. It offers professional-quality equipment in a comfortable working environment.

Film and video facilities include two fully equipped television studios; digital editing facilities; video-editing suites; film editors; and specially outfitted multimedia rooms for all courses. Loan equipment available to students includes digital video cameras; Bolex, Gizmo and Arriflex film

cameras; and field lighting and audio equipment. Additionally, the college operates a cable television station reaching over 400,000 households.

The music industry major's digital audio labs and recording studios in MacAlister Hall and University Crossings offer opportunities for the creation, modification, analysis, and recording of sound and music using analog and digital media.

The Mandell Theater (http://www.drexel.edu/westphal/resources/MandellTheater/Facilities) provides a 420-seat proscenium theater with scene shop, dressing rooms, and costume shop. Costume is taught with primary source material from Drexel's 7,000- piece Historic Costume Collection (http://www.drexel.edu/westphal/resources/FHCC).

The Ellen Forman Memorial Dance Studio, adjacent to the Mandell Theater is the primary studio for the Dance major.

In University Crossings, a 25,000 square foot space houses offices for film, video, screenwriting, and playwriting faculty as well as two state-of-the-art digital editing facilities, a shooting and motion capture studio with special effects capability, two screening rooms, several multi-media classrooms, a laboratory for game development and research, laboratories for other digital media purposes and for music industry, and a well-stocked equipment room.

Fashion, Product Design & Merchandising Faculty

Kristen Ainscoe, BS *(Drexel University)*. Assistant Teaching Professor. Visual merchandiser; merchandise management.

Catherine Byers, MA *(American University)*. Assistant Teaching Professor. Journalism; marketing and communications.

Nick Cassway, BFA *(Tyler School of Art)*. Assistant Teaching Professor. Curating; experimental portraiture; computer design.

Anne C. Cecil, MA *(University of the Arts) Program Director, Design & Merchandising*. Teaching Professor. Web designer, product designer, merchandising and artist.

Renee Weiss Chase, MS *(Drexel University)*. Professor. Fashion designer; computer-aided design systems for the fashion curriculum.

Anita Dennis, AST *(Art Institute of Philadelphia) Fashion Laboratory Technician*. Assistant Teaching Professor. Fashion designer and technician; construction skills.

Genevieve Dion, MFA *(University of the Arts)*. Assistant Professor. Industrial designer, wearable artist, new materials technology research.

Michael Glaser, MFA *(Ohio State University) Program Director for Product Design*. Assistant Professor. Quantifying the designer's intuition; the interplay between digital and physical forms; human desire to shape our surroundings.

Cynthia Golembuski, MS *(Drexel University) Associate Program Director, Fashion Design*. Assistant Teaching Professor. Fashion designer, illustrator, computer aided design.

Roberta Hochberger Gruber, MS *(Drexel University) Head of the Fashion and Product Design & Merchandising Department*. Associate Professor. Fashion designer and illustrator; wearable artist, merchandiser, special events.

Joseph H. Hancock, II, PhD *(Ohio State University)*. Associate Professor. Apparel merchandising, textiles and clothing, culture and marketing strategies.

Lisa L. Hayes, BFA *(Syracuse University) Program Director, Fashion Design*. Associate Professor. Fashion designer, product designer, pattern design.

Jan Marshall, BA *(Long Island University)*. Assistant Teaching Professor. Fashion designer, knitwear, product development, fashion analysis.

Kathi Martin, MSIS *(Drexel University) Associate Director of the Graduate Program in Fashion Design*. Associate Professor. Fashion and textile designer; textile artist; computer-aided design, best practices online databases and graphic interfaces for fashion and historic costume, virtual characters for fashion design.

Alphonso McClendon, MS *(Drexel University)*. Assistant Professor. Fashion designer, textile designer, computer aided design.

Beth Phillips, MS *(Georgetown University)*. Associate Teaching Professor. Business and international marketing, linguist, analysis of products.

Juanita Phillips, BS *(Drexel University)*. Assistant Teaching Professor. Fashion designer and educator.

Clare Sauro, MA *(Fashion Institute of Technology) Curator of the Drexel Historic Costume Collection*. Assistant Teaching Professor. Museum studies: costume and textiles.

Interior Architecture and Design

Major: Interior Architecture and Design
Degree Awarded: Master of Science
Calendar Type: Quarter
Total Credit Hours: 69.0
Classification of Instructional Programs (CIP) code: 50.0408
Standard Occupational Classification (SOC) code: 17-1011; 27-1025

About the Program

The Master of Science program in Interior Architecture & Design at Drexel is an internationally recognized CIDA accredited First Professional MS degree that prepares students of diverse undergraduate backgrounds to become leaders in the field of interior design. Through an integrated studio approach, coursework teaches application of design concepts, technical information and hands-on skills to create a range of public, commercial, residential and institutional spaces. Students learn to transform space to address aesthetic, social, physical and psychological needs. In conjunction with the integrated studio, the program emphasizes independent research culminating in a master's thesis. The Master of Science program in Interior Architecture & Design was recently ranked 7th in the nation by DesignIntelligence, America's Best Architecture & Design Programs 2014.

Comprised of 69.0 graduate credits, most students complete the MS Interior Architecture & Design program in two to three years, depending upon individual student backgrounds and the completion of all necessary prerequisites.

Student Background

MS Interior Architecture & Design students come to the program with undergraduate degrees in a wide variety of fields. With more than 90% of the applicants having backgrounds in a non-design related field and

on average 10% being international students, the graduate student body brings rich and diverse life and cultural experiences to the Department and the College. Open mindedness and the desire and commitment to acquire knowledge through various avenues ensure that all students enrich the exchange of ideas and professional development.

Professional Opportunities

Alumni are principals of their own interior design firms, project managers in major design and architectural firms, facilities managers, and design coordinators. About one-third of the students obtain entry-level employment before graduation from the program; within five years, many hold managerial positions.

Professional exposure occurs in exchanges with practitioners through professional jurying of all major student projects. Students are also encouraged to become members of local, national, and international interior design professional organizations.

For more information, visit Drexel's Graduate Studies in Interior Architecture & Design (http://www.drexel.edu/westphal/academics/ graduate/interiordesign) web page.

Admission Requirements

Admission criteria for the graduate program consist of the requirements of the University for graduate admission plus satisfaction of basic interior design undergraduate coursework. These prerequisites include courses in design, drawing, and art history.

Prerequisite Undergraduate Coursework

ARTH 103	History of Art: Early to Late Modern	3.0
VSST 104	Accelerated Design I [*]	2.0
VSST 105	Accelerated Design II [*]	2.0
VSST 106	Accelerated Design III [*]	2.0
VSST 110	Introductory Drawing	3.0
INTR 160	Visualization I: Computer Imaging	3.0
INTR 200	History of Modern Architecture and Interiors	3.0
INTR 220	Visualization II: Orthographic	3.0
INTR 231	Structure	4.0
INTR 232	Interior Studio I	4.0
INTR 241	Visualization III: Digital	3.0
INTR 300 [WI (p. 240)]	Visual Culture: Interiors	3.0
INTR 305 [WI (p. 240)]	Visual Culture: Furniture	3.0

[*]   Or VSST 101, VSST 102, VSST 103 (Design I, II, III; 12.0 credits).

The program begins in the summer term with three terms of prerequisite coursework that prepares candidates for the graduate coursework. A portfolio review or evaluation by the Associate Director of the Interior Architecture & Design program determines what prerequisites have been satisfied. Contact the Graduate Studies in Interior Architecture & Design (http://www.drexel.edu/westphal/academics/graduate/interiordesign) for specific information about prerequisites or to make an appointment for review and evaluation.

For additional information on requirements and how to apply, visit Graduate Admissions (http://www.drexel.edu/grad/programs/westphal/ interior-architecture-and-design) at Drexel University.

Degree Requirements

The full-time graduate coursework combines seven terms of faculty-directed coursework in interior design, including a student-initiated thesis.

The 69.0 credits that make up the graduate requirement include a visual studies sequence as well as elective coursework in the following areas: interior design seminars on specific topics; advanced studies in art, art history, and interior design; and independent studies. This allows individual flexibility in curriculum design.

Required Courses

Studios		
INTR 722	Graduate Studio A	4.0
INTR 723	Studio A Seminar	2.0
INTR 732	Graduate Studio B	4.0
INTR 733	Studio B Seminar	2.0
INTR 742	Graduate Studio C	4.0
INTR 743	Studio C Seminar	2.0
INTR 752	Graduate Studio D	4.0
INTR 753	Studio D Seminar	2.0
INTR 762	Graduate Studio E	4.0
INTR 763	Studio E Seminar	2.0
Visual Studies		
VSST 501	Contemporary Art Issues	3.0
VSST 502	Space/Time I	3.0
IAD Seminars		
INTR 861	Advanced Visual Methods	3.0
INTR 862	Interior Systems I	3.0
INTR 863	Advanced Digital Methods	3.0
INTR 864	Material Investigations	3.0
INTR 865	Interior Systems II	3.0
Electives		9.0
Thesis		
INTR 894	Thesis Programming	3.0
INTR 897	Thesis - Development	3.0
INTR 898	Thesis - Documentation	3.0
Comprehensive Exam		
INTR 899	Comp Exam for Interior Design [*]	0.0
Graduate Review [*]		
Total Credits		**69.0**

[*]   INTR 899 consists of two components: a series of sketch problems and design competitions that must be completed during the two + graduate years and a faculty review of a portfolio presentation of a body of student-selected work.

Facilities

The interior design program is housed in the new URBN Center, a state of the art design and arts facility on Drexel's campus. The URBN Center officially opened in September 2012. A hub for creative minds to gather, share ideas and work together to bring those ideas from the mind to the

page, and into the world of tomorrow, interiors students benefit from a wide-range of resources including interior design studios, the interior design resource library, a hybrid making lab, and state-of-the-art computer laboratories. College lab equipment includes scanners, printers, plotters, laser cutters, 3-d printers, computer/video projection systems and other peripheral devices as appropriate to each major.

The URBN Annex houses a black box theater, screening room and the Leonard Pearlstein Gallery. Additional studio and classroom space in the Peck Problem Solving and Research Center and the Design Arts Annex accommodate photography, basic design, painting, sculpture and a large woodworking shop with industrial-quality equipment. The woodshop is available for use by students for three-dimensional coursework or individual projects.

Philadelphia, one of the nation's major design centers, gives interior design students the vitality of the contemporary arts at local galleries; easy access to many museums, libraries, renowned buildings, and access to the resources of The Marketplace, as well as design centers located in New York City and Washington, D.C.

Architecture + Interiors Faculty

David Ade, AIA, BArch *(Drexel University)*. Adjunct Associate Professor. Principal, SMP Architects.

Dr.-Ing. Ulrike Altenmüller-Lewis, AIA, Dr.-Ing., *(Bauhaus Universitätat Weimar) Program Director*. Assistant Professor. Research on educational environments; translations of architectural theory texts. Design studios, lectures and seminar courses.

Stephen Bonitatibus, AIA, MArch *(University of Pennsylvania)*. Adjunct Professor. Principal, Bonitatibus Associates.

Mark Brack, PhD *(University of California at Berkeley)*. Associate Professor. British and American architecture from 1700 to the present; Hispanic colonial architecture in the American Southwest; vernacular architecture; historic preservation.

Michael Burns, RA, BArch *(Drexel University)*. Adjunct Associate Professor. Principal, Michael Burns Architects.

Jon Coddington, AIA, MArch *(University of Pennsylvania) Department Head, Department of Architecture + Interiors*. Professor. Architecture, urban design and planning.

Rena Cumby, BArch, MS *(Drexel University) Associate Department Head of the Department of Architecture + Interiors*. Associate Professor. Interior designer; foundation studies and design education.

Eugenia Ellis, PhD *(Virginia Polytechnic State University)*. Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Jeff Fama, MArch *(State University of New York at Buffalo)*. Adjunct Associate Professor. Retail, entertainment, and theater design. Graduate interiors thesis advisor.

Gary Garofalo, BS Arch Eng *(Pennsylvania State University)*. Adjunct Assistant Professor. Principal Lighting Design Collaborative. Lighting expert. Lighting design.

Don Jones, AIA, MArch *(University of Pennsylvania)*. Adjunct Professor. Ewing Cole.

Nicole Koltick, MArch *(University of California)*. Assistant Professor. Researching possibilities for architecture and design through the use of unexpected and innovative interdisciplinary models. Foundation design studios, fabrication and technology seminars.

Karin Kuenstler, MS *(Bank Street College of Education and Parsons)*. Associate Professor. Interior designer; interior design for corporate and commercial facilities, history of corporate interiors, fiber art.

Maria Kuttruff, MS *(Drexel University)*. Adjunct Assistant Professor. Residential interior design. Design studios.

Diana S. Nicholas, AIA, MFA *(University of the Arts, Philadelphia)*. Assistant Teaching Professor. Principal of Switched on Design. Design studios, analog and digital visualization.

Karen Pelzer, BS *(Drexel University) Associate Director of the MS in Interior Architecture and Design Program*. Assistant Teaching Professor. Interior designer, hospitality design. Design studios.

Marilynne L. Rose, MS *(Drexel University)*. Associate Teaching Professor. NCIDQ interior designer; residential and commercial design. Design studios, lecture and seminar courses.

Debra Ruben, MS *(Drexel University)*. Associate Professor. NCIDQ, Interior designer; residential and commercial design. Research on user participation and the design process.

Paul Salvaggio, AIA, BArch *(Pennsylvania State University)*. Adjunct Assistant Professor. Principal, Arcus Design Group. Foundation design studios.

Joseph Scanlon, BArch *(Drexel University)*. Adjunct Professor. Foundation design studios.

Rachel Schade, AIA, MArch. *(University of Pennsylvania)*. Associate Teaching Professor. Principal, Schade & Bolender Architects. Work-study placement. Design studios.

Virginia Smith, MS *(Drexel University)*. Adjunct Associate Professor. Exhibit/graphic design, interior design, interior and architectural visualization.

Erik Sundquist, MArch *(Florida International University) Director of the Hybrid Making Lab of AW CoMAD*. Assistant Teaching Professor. Design studios, analog and digital architectural representation and fabrication.

Feenan Susan, BArch *(Temple University)*. Adjunct Instructor. Institutional and commercial. Design documentation and graduate thesis.

Simon Tickell, AIA, MArch *(University of Pennsylvania) Associate Director of the Architecture Evening Program*. Associate Teaching Professor. Design studios and professional practice/electives; educational and museum buildings.

Nancy Trainer, FAIA, MArch *(University of Pennsylvania)*. Adjunct Professor. Principal, Venturi Scott Brown and Associates, Architects and Planners. Design studios.

Ada Tremonte, BS *(Drexel University) Associate Director of the BS Program in Interior Design*. Assistant Teaching Professor. NCIDQ Interior designer, corporate/commercial design. Design studios, lecture and seminar courses.

Frank de Santis, AIA *(Yale University)*. Assistant Teaching Professor. Design studios, analog and digital architectural representation.

Emeritus Faculty

Judith Bing, MArch *(Yale University)*. Professor Emeritus. Design studios, lecture and seminar courses.

Sylvia Clark, MArch *(University of Pennsylvania)*. Professor Emeritus.

Paul M. Hirshorn, AIA, MArch, MCP, *(University of Pennsylvania)*. Professor Emeritus. Design studios. Former Department Head.

Marjorie Kriebel, B.Arch *(University of Pennsylvania)*. Professor Emeritus.

Museum Leadership

Major: Museum Leadership
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 30.1401
Standard Occupational Classification (SOC) code: 25-4011; 25-4012; 25-4013

About the Program

At the beginning of the 20th century museums were primarily keepers of things—their collections—and were thought of primarily as repositories of knowledge. Over the course of the century the American museum has changed. While collections remain at the core of their missions, museums have focused more and more on their educational roles, their communities and their audiences. The internet and digital technology are challenging museums to rethink how they operate, re-evaluate how they use their collections and the nature of their audiences.

Drexel University's MS in Museum Leadership program prepares students for a range of management and leadership roles that are essential to the integrity and health of today's museums. Students study the philosophy and history of leadership in cultural institutions, incorporating theory and practice from the museum field as well as business, government, and other non#profit organizations. The program examines the process of creating new museums as well as expanding existing museums. Students learn the variety of roles required to run the contemporary museum, including curators, conservators, registrars, educators, programmers, audience development, fundraising, board members and volunteers.

Taking advantage of various departments and programs across Drexel University, such as The Academy of Natural Sciences of Drexel University (http://www.ansp.org), as well as other regional museums, the program includes hands-on participation in learning laboratories during practicum experiences and other opportunities. Importantly, the program encompasses the full range of museums—art, history, science, archaeology, zoos, aquariums, arboretums, historic houses, children's, and folklore— as well as covering both USA and international museum practices.

Goals and Objectives

Drexel's Museum Leadership program will prepare leaders who enable museums to fulfill their missions of stewardship and education. These leaders will develop a knowledge and skill base to steer tomorrow's museums.
Graduates of the program will be prepared:

- To lead museums that preserve, present and critically interpret the knowledge and heritage of diverse human societies and identities;
- To lead museums that will achieve financial security and stability;
- To address the changing nature of museums, including expanding new technologies, educational and community outreach goals, changing demographics, and a changing political and funding environment;
- To build museums that address changing public expectations of the museum experience, including responsiveness to their diverse communities as well as a more participatory visitor experience;
- To contribute to a museum workforce that is culturally rich, representing the full diversity of each museum's surrounding community;
- To engage with the full spectrum of their local communities as well as a national and international community of museums and museum-goers.

Additional Information

For additional information about this program, contact:

Dr. Danielle Rice
Director, Museum Leadership Program
URBN Center, 210G

Danielle.rice@drexel.edu

Degree Requirements

Required Courses

AADM 610	Financial Accounting for Non-Profit Arts Organizations	3.0
AADM 650	Fund Development for the Arts	3.0
INFO 748	Museum Informatics	3.0
MUSL 500	Museum History and Philosophy	3.0
MUSL 510	Museum Leadership	3.0
MUSL 530	Inside the Museum	3.0
MUSL 670	Museum Communications and Marketing	3.0
MUSL 710	Bricks and Mortar	3.0
MUSL 750	Museum Leadership Practicum I	3.0
MUSL 755	Museum Leadership Practicum II	3.0
MUSM 500	Foundations of Informal Education in Museum Settings	3.0
Select four of the following:		12.0
AADM 620	Law and the Arts	
AADM 660	International Cultural Policy	
AADM 670	Audience Development	
AADM 680	Trends in Fund Development	
AADM 710	Strategic Planning and Evaluation	
AADM 731	Human Resources Management in the Arts	
AADM 753	Visual Arts Organization Management	
AADM 754	Museum Management	
AADM 759	Cultural Organizations in Transition	
INFO 552	Introduction to Web Design for Information Organizations	
INFO 643	Information Services In Organizations	
MUSL 630	Exhibitions and Programming	
MUSL 640	The Museum in the Community	

MUSL 660	Museum in the Age of Technology	
MUSL 720	Overview of Curatorial Practices	
MUSM 506	Technology in Museum Education	
TVMN 620	Audience Measurement	
Total Credits		**45.0**

Admission Requirements

In addition to meeting the general requirements for admission to graduate studies at Westphal College of Media Arts and Design, applicants should present a resume demonstrating a strong affinity for the field through work, volunteer experiences, education or special training.

Preparation must include at least one undergraduate level course in financial accounting, two courses in any field related to museum practice, and/or two years' professional or board level experience with a museum. Students entering the program without the required undergraduate accounting course must complete the pre-requisite within the first two terms of matriculation.

Applicants must have a minimum 3.0 GPA in their undergraduate work, and for international students whose first language is not English, the minimum TOEFL score is 90/577.

For additional information on requirements and how to apply, visit Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/westphal).

Sample Plan of Study

Term 1		Credits
MUSL 500	Museum History and Philosophy	3.0
MUSL 510	Museum Leadership	3.0
MUSL 530	Inside the Museum	3.0
	Term Credits	**9.0**
Term 2		
AADM 650	Fund Development for the Arts	3.0
MUSL 670	Museum Communications and Marketing	3.0
MUSM 500	Foundations of Informal Education in Museum Settings	3.0
	Term Credits	**9.0**
Term 3		
AADM 610	Financial Accounting for Non-Profit Arts Organizations	3.0
MUSL 710	Bricks and Mortar	3.0
INFO 748	Museum Informatics	3.0
	Term Credits	**9.0**
Term 4		
MUSL 750	Museum Leadership Practicum I	3.0
Select 2 Electives		6.0
AADM 620	Law and the Arts	
AADM 660	International Cultural Policy	
AADM 680	Trends in Fund Development	
AADM 731	Human Resources Management in the Arts	
AADM 759	Cultural Organizations in Transition	
MUSL 660	Museum in the Age of Technology	

MUSL 720	Overview of Curatorial Practices	
	Term Credits	**9.0**
Term 5		
MUSL 755	Museum Leadership Practicum II	3.0
Select 2 Electives		6.0
AADM 710	Strategic Planning and Evaluation	
AADM 753	Visual Arts Organization Management	
INFO 552	Introduction to Web Design for Information Organizations	
INFO 643	Information Services In Organizations	
MUSL 630	Exhibitions and Programming	
MUSL 640	The Museum in the Community	
MUSL 660	Museum in the Age of Technology	
	Term Credits	**9.0**

Total Credit: 45.0

Global Studies and Modern Languages Faculty

Yaba Blay, PhD *(Temple University)*. Assistant Teaching Professor. Skin bleaching; the politics of Black embodiment (skin color/hair); black identity; Africana cultural aesthetics and aesthetic practices; global black popular culture.

Daniela De Pau, PhD *(University of Illinois at Urbana-Champaign)*. Assistant Teaching Professor. Italian cinema, relationship between literature, cinema and other arts, traveling literature, women writers, the tradition of the Comic and the tradition of the Fantastic, autobiography, politics of immigration, cultural identity in contemporary Italy.

Brenda Dyer, MA *(University of Pennsylvania)*. Associate Teaching Professor. Language acquisition pedagogy, teaching writing, seventeenth and eighteenth century French literature, women writers, translation.

Mary Ebeling, PhD *(University of Surrey)*. Associate Professor. Science and technology studies; emerging technologies and biocapital; media and democratic cultures; radical social movements; sociology of markets; political sociology; and ethnographic methodologies.

David Fryer, PhD *(Brown University)*. Gender theory; psychoanalysis; ethics; queer theory; genderqueer theory; Phenomenology; Africana thought; secular Jewish thought.

Joanna Lyskowicz, MA *(UAM Poznan, Poland)*. Instructor. Comparative linguistics, translation, business Spanish, medical Spanish, modern Spanish literature, XXth cent. Spanish poetry, magical realism in Latin American literature.

Maria delaluz Matus-Mendoza, PhD *(Temple University) Language Program Coordinator*. Associate Professor. Spanish Linguistic variation in the US; the relationship between language variation and mobility (social and geographical) among the Mexican communities in Mexico and in the United States; second language acquisition; language variation in media.

Rogelio Minana, PhD *(Penn State) Department Head, Global Studies and Modern Languages*. Professor. The role of classic cultural icons, particularly Don Quixote, in 21st century political and social justice discourse; the interplay between the traditional humanities, youth organizations, and digital storytelling.

Anne-Marie Obajtek-Kirkwood, PhD *(University of Pennsylvania).* Associate Professor. French and francophone 20th and 21st century literature, culture and film. Representations of the Occupation (WWII); war; minorities in France; autobiography; feminist issues.

Joel E. Oestreich, PhD *(Brown University) Director of International Area Studies.* Associate Professor. International organizations, international finance, development, and human rights.

Marilyn Gaye Piety, PhD *(McGill University).* Associate Professor. History of philosophy, philosophy of religion, critical reasoning, Kierkegaard.

Simone Schlichting-Artur, EdD *(University of Pennsylvania) Senior Assistant Dean of Global Initiatives.* Teaching Professor. International business communication (Germany and the U.S.), public health policy and languages, German post-war history through film and literature, development of writing assessment tools for German minor.

Natsumi Shor, MA. Assistant Teaching Professor. Business and professional Japanese; Japanese film and culture; interrelation between Japanese language to the nation's culture and thought.

Interdepartmental Faculty

Anne C. Cecil, MA *(University of the Arts) Program Director, Design & Merchandising.* Teaching Professor. Web designer, product designer, merchandising and artist.

George Ciccariello-Maher, PhD *(University of California, Berkeley).* Assistant Professor. Colonialism, social movements, political theory.

Rose Corrigan, PhD *(Rutgers University).* Associate Professor. Women, public law, American politics and policy.

Christian Hunold, PhD *(University of Pittsburgh).* Associate Professor. Environmental policy; comparative politics; political theory.

Gabriella Ibieta, PhD *(City University of New York).* Associate Professor. Comparative literature; Cuban and Latin American fiction.

Emmanuel F. Koku, PhD *(University of Toronto).* Associate Professor. Social network analysis; qualitative/quantitative research; medical sociology; social epidemiology; social demography; sociology of development; communication and information technology; community and urban sociology.

Christopher A. Laincz, PhD *(Duke University) Department of Economics and International Business.* Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Usha Menon, PhD *(University of Chicago).* Associate Professor. Self, identity & personhood, emotional functioning, Hindu morality, gender relations in Hindu society, adult development, popular Hinduism, post-colonial feminism, Hindu religious nationalism and Islamic radicalism.

Julie Mostov, PhD *(New York University) Vice Provost for Global Initiatives.* Professor. Modern political thought, democratic theory, nationalism, gender studies, South Eastern Europe and the Balkans.

Emilie S. Passow, PhD *(Columbia University) Director, Certificate Program in Medical Humanities.* Associate Teaching Professor. Judaic studies; medical humanities; nineteenth-century British literature.

Rakhmiel Peltz, PhD *(Columbia University, Linguistics; University of Pennsylvania, Biological Sciences) Director of Judaic Studies Program.*

Professor. Sociolinguistics, ethnography of communication, social history of Yiddish language and culture, Yiddish culture of Eastern Europe, language planning, language and ethnic identity, language and group memory, aging and ethnicity, history of urban neighbors.

Abioseh Porter, PhD *(University of Alberta, Canada) Department Head, English and Philosophy.* Professor. Comparative literature; postcolonial literatures; Editor, *JALA, Journal of the African Literature Association.*

Robert Powell, PhD *(Temple University).* Assistant Teaching Professor. Early and Middle Bronze Age Crete; archaeoastronomy; early state formation; archaeology and anthropology of frontiers; mass communication.

Rachel R. Reynolds, PhD *(University of Illinois at Chicago).* Associate Professor. Sociolinguistics, ethnography of communication, intercultural communication, globalization and the rhetoric of community, political economy of immigration, race and ethnicity, new African immigrants in the United States, Igbo studies.

Wesley Shumar, PhD *(Temple University) Department Head, Anthropology.* Professor. Ethnography of cyberspace, online learning communities, political economy of higher education, globalization, activity theory, semiotics, critical realism, psychoanalysis, identity and the self.

Judith Storniolo, PhD *(University of Pennsylvania).* Teaching Professor. Historical and comparative linguistics, Mesoamerican languages and culture, applied anthropology, public policy, oral traditions and narratives, ideology and ritual, Mesoamerican ethnohistory; and pre-Columbian literature.

Alden Young, PhD *(Princeton University) Director of the Program in Africana Studies.* Assistant Professor. African history; economic history and the history of Arab and African interactions.

Jennifer Yusin, PhD *(Emory University).* Associate Professor. Postcolonial literature; trauma theory; literary theory; psychoanalysis, and memory studies in contemporary literature in English.

Paul F. Harron Television Management Program

Major: Television Management
Degree Awarded: Master of Science (MS); Master of Science/Master of Business Administration (MBA)
Calendar Type: Quarter
Total Credit Hours: 49.0 (MS) or 79.0 (MS/MBA)
Classification of Instructional Programs (CIP) code: 09.0701
Standard Occupational Classification (SOC) code: 27-2012

About the Program

The Paul F. Harron Graduate Program in Television Management will celebrate its tenth anniversary in academic year (AY) 2014-2015. The program draws a global student body, and its graduates hold responsible positions in top media companies around the world.

In September 2015 we will launch the online version (http://www.drexel.com/online-degrees/business-degrees/television-management) of the graduate on-campus program.

The Paul F. Harron Television Management program offers two approaches to graduate study: the MS in Television Management and the dual MS/MBA degree option.

The stand-alone MS degree prepares students with a solid grounding in business management and specialized courses in the management of television and converged media. The program integrates business course content with current practice in the television industry. Students interact with working professionals on campus and in the field through internships. Course content includes programming analysis and strategy, media analytics and audience measurement, structural analysis of media industries, scope and methods of the field, media finance, social media and television, media sales models and practice, media law and ethics, telecommunications policy and public interest law, field internships, and topical electives.

The dual degree option includes a full MBA. Students in both programs gain hands-on management experience through internships in broadcast television stations and networks, cable companies, independent production companies and evolving media hybrids that operate in the region and beyond. The program combines practical and academic experience, including courses designed to challenge students to discover the critical interplay between creative process and the business skills required to manage successful media companies.

About the Curriculum

The television industry is undergoing a radical transformation, the signs of which are everywhere to be found. You don't have to search the trades, academic, or popular press for very long to discover that the converged world of television has undergone a sea change in the face of new revenue models, rapidly changing telecommunications policy, transformative technology, shifting audience loyalties, dynamic delivery platforms, and a volatile national and global marketplace; Big Data, Netflix, Roku, Apple TV, Amazon Prime, the challenge of Aereo, Blufin Laboratories, traditional media transformations, social media begetting social television, broadcast TV incentive auctions, retransmission consent, net neutrality, backbone networks, edge and broadband providers, end users, neuro-marketing and biometrics, Google Glass, Occulus Rift Virtual Reality goggles, wearable technologies, OLED screens, 4k and 8k video projection, streaming media, WiMAX and Wi-Fi…the list of change agents affecting the legacy television industry is much longer than this. But the impact is clear**:** television has changed, is changing and will continue to change; and our students will become the next generation of change agents.

Today's television and media industries are some of the most competitive and fastest growing in the world, and this has created new opportunities for those who can manage, market and create for the world of converged media. The Paul F. Harron Graduate Program in Television Management offers two graduate study options to prepare students for the demanding television and media industries: the MS in Television Management and the dual MS/MBA.

The stand-alone MS degree offers a solid grounding in business management and specialized courses in the management of television and evolving media hybrids. The dual MS/MBA option allows students to integrate business course content with the practices of television and new media industries, and provides graduates the advantages of also having the renowned Drexel MBA.

Ultimately, we believe the way people learn is by doing. Students engage in hands-on management experience through internships at broadcast television stations and networks, multi-channel video programming

distributors, streaming media and evolving web companies, independent production companies, and emerging media hybrids in the region and beyond. The program combines practical and academic experience in courses such as Audience Measurement, TV Programming, Structure of TV Organizations, Media Law, Media Sales, Media Ethics, Money and the Medias, Social TV, Emerging TV Technologies and TV Production. Students gain hands-on management insights through simulations in retransmission consent negotiation, technology management, contract negotiation, and debate around technology assessment. These courses challenge participants to discover the critical interplay between creative process and the business skills required to manage successful media companies.

Program Features

Features of the program include the availability of Fellowships and Graduate Assistantships, flexible scheduling with part-time and full-time options, evening classes, rolling admissions (allowing students to start in any term, including summer) as well as professional internships. Philadelphia is the fourth largest television market and home to Comcast, Banyan Productions, Center City Video, Shooters, broadcast network affiliates, three public television organizations, Tierney Communications, Harmelin Media, Star Group, Domus, and innovative web-streaming and specialized digital content producers and online agencies such as 03World.

Students find internships and employment with major broadcast, multichannel, and new media companies in Philadelphia, New York, Washington, Los Angeles, London, Beijing, and beyond, including:

- CNN
- NBC/Universal
- Sony
- NBC SportsChannel
- China Central TV
- Time, Inc.
- University of Pennsylvania
- Nielsen
- Harmelin Media
- SMG Shanghai
- Disney
- Katz Media Group
- Discovery Channel
- Raycom Media
- Shanghai Media Group
- Game Show Network
- USA Networks
- Bounce TV
- Reign Deer Entertainment
- PBS/Sprout
- Philly.com
- Comcast SportsNet
- NBC Sports
- MTV Networks
- Sesame Workshop
- Pro Mobile Productions
- Sony
- PHL 17

- NBC10
- CBS3/CW
- WPVI6
- WYBE35
- Center City Video
- CCTV
- CNBC International
- Princeton University
- QVC
- National Geographic Channel
- Univision
- Nancy Glass Productions
- Telemundo
- Dreamworks
- and many others.

Additional Information

For information about Television Management students, faculty, alumni, internships and the structure and operation of the program, please visit the Graduate Television Management (http://www.drexel.edu/westphal/graduate/TVMN) website.

Admission Requirements

For information regarding admission to the program, contact:

Albert Tedesco
Program Director, Paul F. Harron Television Management Graduate Program
Antoinette Westphal College of Media Arts and Design
Office: University Crossings 049
(215) 895-2180
ast33@drexel.edu

or
David Miller
Director of Recruitment
The Antoinette Westphal College of Media Arts and Design
Nesbitt Hall 12-503
Philadelphia, PA 19104
(215) 895-1675

Forms, additional application requirements, and information about application deadlines are all available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/westphal) website.

For more information about the program, visit Drexel's Graduate Studies in Television Management (http://www.drexel.edu/grad/programs/westphal/television-management) web page.

Degree Requirements

Master of Science Degree: 49.0 quarter credits

Required Courses

TVMN 605	Scope and Methods of the Field	3.0
TVMN 610	Media Law for Television Management	3.0
TVMN 620	Audience Measurement	3.0
TVMN 640	Media Ethics of Television Management	3.0
TVMN 650	Structure of Television Organizations	3.0
TVMN 710	Television Programming	3.0
TVMN 730	TV Technology	3.0
TVMN 740	Money and the Media	3.0
TVMN 790	Thesis in TV Management	3.0
TVMN 791	Thesis Completion [*]	1.0
Select two of the following:		6.0
TVMN 600	Television Management Colloquium	
TVMN 630	Television Production	
TVMN 660	The Social Impact of TV	
TVMN 670	The Art of Television	
TVMN 680	Management of News and Sports Programming	
TVMN 698	Special Topics in TV Mgmt	
TVMN 699	Independent Study in TV Mgmt	
TVMN 700	Television Practicum	
TVMN 720	Television Organization and Operations	
TVMN 750	Current Issues in TV Management	
TVMN 770	Promotion and PR in the Media	
Required Business Courses		
ACCT 601	Managerial Accounting	3.0
MGMT 652	New Venture Planning	3.0
BUSN 505	Financial Performance of the Firm - Accounting	1.5
BUSN 506	Financial Performance of the Firm - Finance	1.5
BUSN 507	Essentials of Economics I	1.5
BUSN 508	Essentials of Economics II	1.5
MKTG 601	Marketing Strategy & Planning	3.0
Total Credits		**49.0**

[*] TVMN 791 is repeatable for credit, at .5 credits per quarter, as needed for thesis completion. Students must enroll for a minimum of 2 quarters.

Master of Science Degree (Stand-alone program)

First Year

Fall		Credits
BUSN 505	Financial Performance of the Firm - Accounting	1.5
BUSN 506	Financial Performance of the Firm - Finance	1.5
BUSN 507	Essentials of Economics I	1.5
BUSN 508	Essentials of Economics II	1.5
TVMN 605	Scope and Methods of the Field	3.0
TVMN 710	Television Programming	3.0
	Term Credits	**12.0**
Winter		
MGMT 652	New Venture Planning	3.0
MKTG 601	Marketing Strategy Planning	3.0
TVMN 620	Audience Measurement	3.0
TVMN 650	Structure of Television Organizations	3.0
	Term Credits	**12.0**
Spring		
ACCT 601	Managerial Accounting	3.0
TVMN 730	TV Technology	3.0

TVMN 740	Money and the Media	3.0
Television Management (TVMN) elective		3.0
	Term Credits	**12.0**
Summer		
TVMN 610	Media Law for Television Management	3.0
TVMN 640	Media Ethics of Television Management	3.0
TVMN 790	Thesis in TV Management	3.0
Television Management (TVMN) elective		3.0
	Term Credits	**12.0**
Second Year		
Fall		
TVMN 791	Thesis Completion (repeatable for credit)	0.5
	Term Credits	**0.5**
Winter		
TVMN 791	Thesis Completion (repeatable for credit)	0.5
	Term Credits	**0.5**

Total Credit: 49.0

Degree Requirements

Dual MS/MBA: 79.0 quarter credits

Required Courses

TVMN 605	Scope and Methods of the Field	3.0
TVMN 610	Media Law for Television Management	3.0
TVMN 620	Audience Measurement	3.0
TVMN 640	Media Ethics of Television Management	3.0
TVMN 650	Structure of Television Organizations	3.0
TVMN 710	Television Programming	3.0
TVMN 730	TV Technology	3.0
TVMN 740	Money and the Media	3.0
TVMN 790	Thesis in TV Management	3.0
TVMN 791	Thesis Completion *	1.0

Television Management Electives

Select two of the following:		6.0
TVMN 600	Television Management Colloquium	
TVMN 630	Television Production	
TVMN 660	The Social Impact of TV	
TVMN 670	The Art of Television	
TVMN 680	Management of News and Sports Programming	
TVMN 698	Special Topics in TV Mgmt	
TVMN 699	Independent Study in TV Mgmt	
TVMN 700	Television Practicum	
TVMN 720	Television Organization and Operations	
TVMN 750	Current Issues in TV Management	
TVMN 770	Promotion and PR in the Media	

Required Business Courses

ACCT 601	Managerial Accounting	3.0
ECON 601	Managerial Economics	3.0
BUSN 505	Financial Performance of the Firm - Accounting	1.5
BUSN 506	Financial Performance of the Firm - Finance	1.5
BUSN 507	Essentials of Economics I	1.5
BUSN 508	Essentials of Economics II	1.5
FIN 601	Corporate Financial Management	3.0
MGMT 602	Managing Technology Innovation	3.0
MGMT 652	New Venture Planning	3.0
MGMT 780	Strategic Management	3.0
MKTG 601	Marketing Strategy & Planning	3.0
MIS 611	Aligning Information Systems and Business Strategies	3.0
ORGB 625	Leadership and Professional Development	3.0
ORGB 631	Leading Effective Organizations	3.0
POM 601	Operations Management	3.0
STAT 601	Business Statistics	3.0
Business Elective		3.0
Suggested Business Electives:		
FIN 640	Mergers and Acquisitions	
MKTG 622	Buyer Behavior Theory	
MKTG 634	Integrated Marketing Communications Management	
MKTG 646	Services Marketing	
MGMT 640	Strategic Human Resource Management	
Total Credits		**79.0**

*   TVMN 791 is repeatable for credit, at .5 credits per quarter, as necessary for thesis completion. Students must enroll for a minimum of 2 quarters.

Facilities

Facilities and opportunities for the program include:

- Field trips to broadcast stations and networks in Philadelphia, Washington, D.C., and New York (http://www.drexel.edu/westphal/graduate/TVMN/Curriculum/Seminars/Fall2012)
- Civic engagement projects in Philadelphia and internationally (http://www.drexel.edu/westphal/graduate/TVMN/civicengagement)
- The LeBow College of Business (http://www.lebow.drexel.edu)
- The Laurence A. Baiada Institute for Entrepreneurship (http://www.lebow.drexel.edu/Centers/Baiada)
- Professional social media groups (https://www.linkedin.com/groups?home=&gid=6613646)
- Business planning courses
- Incubator competitions sponsored by the Baiada Center
- The Henderson Challenge (business plan competition)
- The Rudman Institute for Entertainment Industry Studies
- DUTV (http://dutv.drexel.edu/television/Main.html), Drexel's educational cable access channel

As part of their MS/MBA course of study, students take full advantage of the new Gerri C. LeBow Hall and the Leonard Pearlstein Business Learning Center, which includes The George and Lois Krall Center for Executive Education, state-of-the-art classrooms, learning facilities, conference rooms, and technology upgrades to meet the needs of MBA students so they can compete aggressively in the global marketplace.

Cinema and Television Faculty

Ian N. Abrams, BA *(Duke University) Program Director, Screenwriting and Playwriting Program*. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA *(Tyler School of Art, Temple University)*. Associate Professor. Digital media.

John Avarese, BS *(Drexel University)*. Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

David Culver, AS *(Graham Junior College) Manager of the Paul F. Harron Studios/DUTV*. Associate Teaching Professor. Film and video.

David Deneen, BFA *(Philadelphia College of Art)*. Associate Teaching Professor. Film & video.

Paul Diefenbach, PhD *(University of Pennsylvania) Associate Program Director, Game Art & Production*. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA *(Pennsylvania State University)*. Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS *(Drexel University) Associate Program Director, Interactive Digital Media*. Assistant Teaching Professor. Advertising, design and interactivity.

Bruce Graham, BA *(Indiana University of Pennsylvania)*. Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA *(Temple University)*. Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD *(Stanford University) Dean, Pennoni Honors College*. Professor. Film and video; cinema studies.

Nick Jushchyshyn, MFA *(Academy of Art University) Associate Program Director, Animation and Visual Effects*. Visual effects, digital media and animation.

Matt Kaufhold, MA *(University of North Carolina)*. Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA *(New York University) Program Director, Film and Video*. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA *(Temple University) Department Head, Cinema and Television Studies*. Associate Professor. Television studies.

David Mauriello, BA *(Lafayette College)*. Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA *(American Film Institute)*. Assistant Teaching Professor. Editing.

Glen Muschio, PhD *(Temple University)*. Associate Professor. Digital media, society, communication.

Lise Raven, MFA *(New York University)*. Assistant Professor. Filmmaker.

Philip W. Salas, BS *(Temple University)*. Assistant Teaching Professor. Utilization of advanced set top box data to measure fragmented viewing behavior. Impact of new television distribution technologies on traditional broadcasters and multichannel program providers.

David A. Schwartz, BA *(Rider University)*. Associate Teaching Professor. Steadicam operator; cameraman.

Andrew Susskind, BA *(Harvard University) Program Director of TV Production & Media Management*. Associate Teaching Professor. Independent television producer and director.

Albert S. Tedesco, MA *(University of Pennsylvania) Director of the Paul F. Harron Graduate Program in Television Management*. Associate Teaching Professor. Impact of digital media on broadcast television; broadcasters' response to the challenge of new media; management of publicly and privately held communications companies.

Jervis Thompson, BS *(Drexel University)*. Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

Michael Wagner, PhD *(Vienna University of Technology) Program Director, Digital Media*. Associate Professor. Educational use of digital media and computer games.

Gregory S. Wolmart, MFA *(University of Pennsylvania)*. Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD *(Georgia Institute of Technology)*. Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA *(Cornell University) Interim Department Head, Arts & Entertainment Enterprise*. Associate Teaching Professor.

The College of Arts and Sciences

About the College

The College of Arts and Sciences is committed to providing high-quality education in the humanities, social sciences, natural sciences and mathematics.

By pursuing excellence in research and scholarship, we train our graduate students to become ethical professionals with expertise in particular areas of inquiry and an appreciation for the fundamental interactions among disciplines in a fast-changing, challenging, and diverse world.

The College of Arts and Sciences (http://www.drexel.edu/coas) was established in 1990, with the merger of the College of Sciences and the College of Humanities and Social Sciences. The college's educational objectives encompass a wide range of goals: to provide interdisciplinary study in the arts and sciences for our Bachelor of Science and Bachelor of Arts majors; to provide general educational courses for the University's undergraduates; to offer Master of Science and Doctoral programs in selected areas of faculty and research strength; to promote research, teaching, and creative activities that cross disciplinary boundaries and enhance faculty expertise and the quality of the University's instruction; and to improve the quality of life for the University's community through co-curricular research and programming in the arts and sciences.

Majors

- Biological Sciences (MS, PhD) (p. 250)
- Chemistry (MS, PhD) (p. 253)
- Communication (MS) (p. 289)
- Communication, Culture and Media (PhD) (p. 256)
- Environmental Policy (MS) (p. 261)
- Environmental Science (MS, PhD) (p. 257)
- Mathematics (MS, PhD) (p. 264)
- Physics (MS, PhD) (p. 266)
- Psychology (MS, PhD) (p. 270)
- Psychology-Law (PhD/JD) (p. 260)
- Public Policy (MS) (p. 261)
- Publishing (MA) (p. 291)
- Science, Technology and Society (MS) (p. 262)

English Language Center

As part of the College of Arts and Sciences, Drexel's English Language Center (http://www.drexel.edu/elc) offers an accredited intensive English program throughout the year. In addition to classes in academic skills such as essay writing and oral presentations, the Center offers the pre-MBA Global Business English program (GLOBE), English for academic purposes, TOEFL and IELTS preparation, and other subjects.

The English Language Center offers academic language preparation for students who have admissible high school academic background but need further English language proficiency and through the International Gateway program, a pathway program combining academic English

language courses, credit courses taught by COAS faculty, and acculturation activities.

Students admitted into the University Preparation program (UPREP) begin their studies at Drexel in the English Language Center in a short, pre-term program designed to prepare international students for the academic work and culture of the American university.

Accepted undergraduate students have access to free language tutoring and other academic skills workshops throughout the academic year.

For more information, see the ELC website (http://www.drexel.edu/elc) or contact the Center at:

English Language Center
229 N. 33rd Street
Philadelphia, PA 19104

Phone: 215-895-2022
Fax: 215-895-6775
E-mail: elc@drexel.edu

Biological Sciences

Major: Biological Sciences
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS) or 90.0 (post-bachelor's) or 45.0 (post-master's)
Classification of Instructional Programs (CIP) code: 26.0101
Standard Occupational Classification (SOC) code: 19-1029

About the Program

The Department of Biology (http://drexel.edu/coas/academics/departments-centers/biology) offers graduate programs in biological sciences leading to the doctorate degree and to the thesis or non-thesis master of science degree. The curricula and research programs are designed to help students achieve success in their degree programs and pursue positions of leadership in their respective fields of research.

The intellectual life of the department relies heavily on the participation, creativity and the energy of graduate students; therefore the department expects students to be vigorously involved in courses, seminars, journal clubs, research, informal discussions, and departmental functions.

MS in Biological Sciences

Degree Requirements

Soon after matriculation the student completes a plan of study with the advisor, outlining his or her specific program. Both thesis and non-thesis options are available. Conducting formal research necessary for the thesis is dependent upon the student finding a faculty member whom will serve as their faculty advisor and supervise a mutually agreed upon research project.

Students wishing to pursue PhD candidacy are encouraged to elect the MS with thesis. After all other requirements are completed, the research MS student defends the thesis at a final oral examination. The non-thesis student takes a comprehensive examination.

Requirements for the MS Curriculum with Thesis

BIO 500	Biochemistry I	3.0

BIO 532	Advanced Cell Biology	3.0
BIO 540	Readings in Molecular and Cellular Bioscience and Biotechnology	3.0
BIO 601	Research Methods	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
BIO 679	Issues in Scientific Research	3.0
BIO 997	Research in Bioscience	9.0
ENVS 506	Biostatistics	3.0
Five Bioscience (BIO) or Environmental Science (ENVS) electives		15.0
Total Credits		**45.0**

Requirements for the Non-thesis MS Curriculum

BIO 500	Biochemistry I	3.0
BIO 532	Advanced Cell Biology	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
BIO 679	Issues in Scientific Research	3.0
ENVS 506	Biostatistics	3.0
Bioscience (BIO) or Environmental Science (ENVS) electives [*]		30.0
Total Credits		**45.0**

[*] *Non-thesis students may elect to take up to 4 credits of BIO 997 Research in Bioscience.

Bioscience Electives Include:

BIO 530	Microbial Genetics	5.0
BIO 566	Endocrinology	4.0
BIO 610	Biochemistry of Metabolism	3.0
BIO 615	Proteins	3.0
BIO 620	Biomembranes	3.0
BIO 625	Nucleic Acids	3.0
BIO 631	Bioinformatics I	3.0
BIO 644	Human Genetics	3.0
BIO 646	Stem Cell Research	3.0
BIO 649	Recombinant DNA Laboratory	5.0
BIO 650	Virology	3.0
BIO 663	Molecular Mechanisms of Neurodegeneration	3.0
BIO 670	Medical Microbiology	3.0
BIO 675	Advanced Immunology	3.0
BIO 680	Course BIO 680 Not Found	9.0

PhD in Biological Sciences

The Doctor of Philosophy in Biological Sciences is conferred in recognition of breadth of scholarship and scientific attainment plus demonstrated ability to complete original research.

The following general requirements must be satisfied in order to complete the PhD program in Biological Sciences:

- 90 (post-bac) or 45 (post-MS) credit hours total
- establishing a plan of study
- 7 core courses
- additional courses dependent on advisor or committee recommendations
- candidacy exam/approval of dissertation proposal
- dissertation/thesis

- defense of dissertation/thesis
- a graduate research seminar presentation once a year for students in their second year and beyond.

Thesis Advisor/Plan of Study

For students admitted without an identified thesis advisor, the thesis advisor must be selected by the end of winter term in the first year. All students are asked to submit a plan of study by the end of the winter quarter first year. It is anticipated that the graduate coursework will be completed during the first two years or less.

Students should check with the department for a list of available electives.

Core Requirement Courses:

BIO 500	Biochemistry I	3.0
BIO 532	Advanced Cell Biology	3.0
BIO 540	Readings in Molecular and Cellular Bioscience and Biotechnology	3.0
BIO 601	Research Methods	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
BIO 679	Issues in Scientific Research	3.0
ENVS 506	Biostatistics	3.0
Total Credits		**21.0**

Sample Sequence/Sample Plan of Study

First Year

Fall		Credits
BIO 500	Biochemistry I	3.0
BIO 532	Advanced Cell Biology	3.0
	Term Credits	**6.0**
Winter		
BIO 540	Readings in Molecular and Cellular Bioscience and Biotechnology	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
	Term Credits	**6.0**
Spring		
BIO 601	Research Methods	3.0
ENVS 506	Biostatistics	3.0
	Term Credits	**6.0**

Second Year

Fall		
BIO 679	Issues in Scientific Research	3.0
Elective		3.0
	Term Credits	**6.0**
Winter		
BIO 620	Biomembranes	3.0
	Term Credits	**3.0**
Spring		
BIO 620	Biomembranes	3.0
	Term Credits	**3.0**

Total Credit: 30.0

Contact the Department of Biology (http://www.drexel.edu/biology) at (215) 895-2624 for more information.

Biology Faculty

Michael Akins, PhD *(Yale University).* Assistant Professor. The neural mechanisms underlying how organisms interact with the environment; circuit formation, particularly of sensory circuits, and neural diseases including autism and Fragile X syndrome (FXS).

Shivanthi Anandan, PhD *(University of California, Los Angeles).* Associate Professor. Microbial genetics, in particular the analysis of light-regulated signal transduction pathways and the regulation of gene expression in photosynthesizing organisms.

Joseph Bentz, PhD *(State University of New York (SUNY) at Buffalo).* Professor. Biophysics, biochemistry and biopharmaceutics, focused on the molecular basis of biological membrane transport and fusion.

John Bethea, PhD *(University of Alabama at Birmingham) Department Head.* Professor. Neuroscience and immunology.

Laura Duwel, PhD *(University of Cincinnati) Assistant Department Head, Department of Biology.* Teaching Professor. Immunology and microbiology.

Felice Elefant, PhD *(Temple University).* Associate Professor. Understanding the roles of two classes of chromatin regulatory proteins termed histone acetyltransferases(HATs)and histone demethylases.

Denise Garcia, PhD *(UCLA).* Assistant Professor. Neuroscience, the role of astrocytes in the central nervous system.

Tali Gidalevitz, PhD *(University of Chicago).* Assistant Professor. Genetic and molecular pathways regulating protein folding homeostasis, and their role in protein conformation diseases, aging, and development.

Mary Katherine Gonder, PhD *(The City University of New York) Director, Bioko Biodiversity Protection Program Co-Founder, Central African Biodiversity Alliance.* Associate Professor. Deciphering spatial patterns of biodiversity across the Gulf of Guinea and Congo Basin region; Conservation measures to mitigate the effects of habitat loss and climate change in western equatorial Africa.

Susan Gurney, PhD *(Westfälische Wilhelms-Universität Münster (Germany)).* Assistant Teaching Professor. Evolutionary genetics (human and equids); stem cell biology; forensic science

Meshagae Hunte-Brown, PhD *(Drexel University).* Associate Teaching Professor. Stable isotopes in aquatic food webs, ecosystem ecology.

Jiu Jiang, MD, PhD *(Shanghai Second Medical University).* Research Associate Professor. T cell immune response to virus infection in aged mice.

Karen Kabnick, PhD *(Massachusetts Institute of Technology).* Assistant Teaching Professor. Principles and techniques in molecular biology.

Joy Little, PhD *(Wake Forest University).* Assistant Teaching Professor. Stem education, cancer cell biology.

Robert Loudon, PhD *(Thomas Jefferson University).* Associate Teaching Professor. Rho GTPases, regulation of actin cytoskeleton, Regulation of G protein-coupled receptors by receptor kinases and arrestins.

Daniel Marenda, PhD *(Syracuse University) Director of the Biology Graduate Program, Co-Director of the Cell Imaging Center .* Associate Professor.

Eric Morschhauser, PhD *(University of Pennsylvania).* Assistant Teaching Professor. Systematics, paleobiology, and taphonomy of Mesozoic archosaurs, including the horned dinosaurs of North America and Western China; Biomechanics of terrestrial locomotion;Applications of high resolution CT scanning.

Donna Murasko, PhD *(Penn State Hershey Medical Center) Dean, College of Arts and Sciences.* Professor. The effects of aging on the adaptive immune response to influenza virus and retrovirus latency and reactivation.

Ryan Petrie, PhD *(McGill University).* Assistant Professor.

Nianli Sang, MB, PhD *((M.B., Fudan University Shanghai Medical College; Ph.D., Thomas Jefferson University) Co-Director of the Cell Imaging Center.* Associate Professor. Molecular and cellular biology of cancer; posttranslational modification, folding and quality control of proteins and their implication in cell physiology and human diseases.

Aleister Saunders, PhD *(University of North Carolina, Chapel Hill) Interim Senior Vice Provost for Research, Director of the RNAi Resource Center.* Associate Professor. Identification and characterization of genes and proteins involved in Alzheimer's disease.

Elias T. Spiliotis, PhD *(The Johns Hopkins University) Director of the Cell Imaging Center .* Assistant Professor. Cell polarity and cell division: regulation of cytoskeleton-dependent motility.

Jennifer Stanford, PhD *(Harvard University).* Assistant Professor. Approaches to improve undergraduate and graduate student learning in cell and molecular biology, biochemistry and genetics.

Monica M. Togna, PhD *(New Jersey Institute of Technology).* Assistant Teaching Professor. Examination of the structure and function of living organisms from the cellular to the organismal level in order to better understand common physiological processes.

Interdepartmental Faculty

Beth L. Leonberg, MS, MA, RD *(Colorado State University, Rowan University) Director, Didactic Program in Dietetics .* Instructor. Pediatric nutrition.

Donna H. Mueller, PhD *(Temple University) Registered Dietitian, Nutrition and Foods.* Associate Professor. Clinical nutrition; pediatric nutrition; nutrition in pulmonary diseases, especially cystic fibrosis; nutrition in developmental delay; dental nutrition; dietetic education and professional development.

Jennifer Nasser, PhD *(Rutgers University).* Associate Professor. Dopamine-mediated mechanisms of food intake regulation in humans and its impact on metabolic homeostasis, especially as it applies to obesity, eating disorders and aging.

Michael O'Connor, MD, PhD *(MD, Johns Hopkins University; PhD, Colorado State).* Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD *(University of Wisconsin-Madison).* Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions;

neurobiology, focusing on brain plasticity and brain evolution in social insects.

Jennifer Quinlan, PhD *(North Carolina State University)*. Associate Professor. Food microbiology; microbiological quality and safety of produce, dairy and meat products in markets in high vs. low socioeconomics areas, Bacillus and Clostridium spores in food processing.

Jacob Russell, PhD *(University of Arizona)*. Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Vicki Schwartz, MS *(Drexel University) Nutrition and Foods*. Assistant Clinical Professor. Advanced nutrition, clinical nutrition, nutrition support.

Emeritus Faculty

Cecilie Goodrich, PhD *(Harvard University)*. Professor Emeritus. Neuroscience and systems physiology, postnatal maturation of physiology and behavior in relation to brain immunocytochemistry.

Wayne E. Magee, PhD *(University of Wisconsin)*. Professor Emeritus. Biochemistry and microbiology, drug delivery using phospholipid vesicles, membrane-membrane interactions, hybridoma research for monoclonal antibody production, immunotherapy, biochemical virology.

Stanley Segall, PhD *(Massachusetts Institute of Technology)*. Professor Emeritus. Flavor evaluation in foods, human organoleptic response, taste and odor, chemistry of sugars in foods, irradiation effects in foods, food science, food safety.

Chemistry

Major: Chemistry
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 40-0501
Standard Occupational Classification (SOC) code: 19-2031

About the Program

The Department of Chemistry (http://drexel.edu/coas/academics/departments-centers/chemistry) offers graduate programs in analytical chemistry, atmospheric chemistry, inorganic chemistry, organic chemistry, materials chemistry, physical chemistry, educational chemistry, and polymer chemistry. The curriculum is designed to prepare students for the research and practical application of chemistry to challenges facing mankind. The department also encourages interdisciplinary activities. Faculty members are active participants in the environmental engineering and science and biomedical science and engineering programs; others work with physicists and biologists in areas such as atmospheric science, biochemistry, and biophysical chemistry.

The chemistry faculty wants graduate students to understand the purpose of, and need for, fundamental research while working on problems of practical interest and application to the challenges facing mankind in the modern world. Areas of research include the use of digital electronic methods to analyze trace constituents of air and water, a study of the molecules of living systems, the effects of toxic chemicals and carcinogens, synthesis and characterization of compounds of medicinal

and industrial interest, methods for studying macromolecules, and characterization of transient species using lasers.

The Department of Chemistry strives to maintain a community of research scholars (faculty, postdoctoral fellows, and graduate and undergraduate students) that is large enough to provide a variety of experiences within chemistry, yet small enough to give each student individual attention. Both full- and part-time study are available.

Admission/Financial Assistance

Requirements for Admission

For admission to graduate study, the department requires a BS in chemistry or the equivalent. This requirement applies to full-time and part-time students working toward either the MS or the PhD degree. All entering MS and PhD students are required to take a series of two-hour exams in analytical, inorganic, organic, and physical chemistry to help assess their preparation for graduate work in chemistry. The scores obtained on these exams are used as a basis for course selection.

It is strongly recommended that students submit Graduate Record Examination (GRE) results with their application. GRE scores are helpful to the Chemistry Department and the Office of Admissions, and are required for those students requesting financial support, i.e., a teaching assistantship (TA) and/or would like to be considered for a Dean's Scholarship or a Provost's Fellowship.

Financial Assistance

Graduate students at Drexel can obtain two main types of financial support: teaching assistantships and research assistantships. Teaching assistantships are available on a competitive basis to incoming students and are normally renewable for several years. All those requesting financial assistance must submit GRE scores.

Forms, details about requirements, and information about application deadlines are all available on the Chemistry (http://www.drexel.edu/grad/programs/coas/chemistry) page of Drexel's Graduate Admissions website.

Master of Science in Chemistry

Degree Requirements

The MS degree is awarded after satisfactory completion of a minimum of 45.0 credit hours in chemistry and related fields, at least 30.0 credits of which must be taken at Drexel. Both thesis and nonthesis options are available.

Course Requirements

The course requirements for both thesis and nonthesis options are one complete sequence in the major area of interest; one of the sequence courses from each of analytical, organic, polymer, and inorganic chemistry; and two courses in physical chemistry. The remaining credits may be chosen from graduate courses within the department or from other departments offering courses related to the student's major areas.

Major Sequence		9.0
Select one of the following sequences:		
Inorganic Chemistry		
CHEM 521	Inorganic Chemistry I	
CHEM 522	Inorganic Chemistry II	
CHEM 523	Inorganic Chemistry III	
Analytical Chemistry		

CHEM 530	Analytical Chemistry I	
CHEM 531	Analytical Chemistry II	
CHEM 755	Mass Spectrometry	
Organic Chemistry		
CHEM 541	Organic Chemistry I	
CHEM 542	Organic Chemistry II	
CHEM 543	Organic Chemistry III	
Physical Chemistry		
CHEM 557	Physical Chemistry I	
CHEM 558	Physical Chemistry II	
CHEM 555	Quantum Chemistry Of Molecules I	
Polymer Chemistry		
CHEM 561	Polymer Chemistry I	
CHEM 562	Polymer Chemistry II	
CHEM 563	Polymer Chemistry III	
Additional Sequence Courses*		15.0
Electives		21.0
Total Credits		**45.0**

*   One of which must be chosen from the following: CHEM 555 Quantum Chemistry Of Molecules I or CHEM 557 Physical Chemistry I.

Thesis Option

Up to 9 credits of coursework may be replaced by either CHEM 997 or by sections of CHEM 680 involving laboratory research. No later than the spring term of the first year of coursework, a student should choose a research advisor with whom to work in carrying out an original investigation in chemistry. The results will be written up in thesis form and submitted to an MS thesis committee consisting of the research advisor and two other departmental faculty appointed by the advisor. The acceptance by this committee of the MS thesis completes the thesis option requirements for the MS degree. Students in the MS program receiving financial aid from the department must elect the thesis option if they do not pursue the PhD program at Drexel.

PhD in Chemistry
Degree Requirements

The PhD degree is awarded in any of eight main areas of chemistry: analytical, atmospheric, inorganic, organic, materials, physical, educational or polymer chemistry. The degree recipient must demonstrate scholastic breadth in chemistry and contribute significantly to scientific advancement in a chosen major area. Requirements of the program include coursework, candidacy examinations, a chemical information retrieval or technical writing course, and successful completion of a publishable PhD thesis.

Course Requirements

Ninety credits of graduate-level work must be completed for the PhD degree. The Chemistry Department requires 30 credits of coursework in chemistry (outlined in the Course Requirements (p. 253) section of the MS program). The balance can be made up of advanced special topics courses and research credits.

Candidacy Requirements

To become a candidate for the PhD in chemistry at Drexel, a student must pass a prescribed set of cumulative examinations.

Cumulative Examinations

Written examinations designed to test a student's background in his or her major area are given monthly during the academic year and occasionally during the summer at the discretion of the faculty. Students should begin taking these examinations after having completed three courses in the major area (usually the main sequence courses), though beginning these exams earlier is possible for well-prepared students. Students normally begin taking these examinations in the fall term of their second year.

Research Seminar

The thesis proposal seminar is designed to help the student conduct his/her research more efficiently by (i) promoting a greater fundamental understanding about the student's own specific research project and (ii) providing context and perspective about previous accomplishments in the field by other research groups as well as her/his own. The subject of the seminar will be a literature review and a description/defense of the student's research project including results of experiments and investigations already conducted as well as future work. The examination at which the thesis proposal is defended is held no later than the end of the **winter** term of the **second** year for **full-time** students or the end of the **spring** term of the **second** year for **part-time** students. A written report is submitted to the committee no later than two weeks before the examination. A passing grade on this examination is required for continuation in the PhD program.

Thesis

A PhD thesis — the heart of the PhD degree — must be written, accepted by the research supervisor, presented to a PhD Thesis Examining Committee, and defended orally to the satisfaction of the Examining Committee. It is the responsibility of the student, not the research supervisor, to submit an acceptable thesis. It is expected that the student will have at least one peer-reviewed research article accepted for publication by the time of the thesis defense.

Facilities

There are seven undergraduate teaching laboratories in the department: three freshman Chemistry labs, an advanced Organic Chemistry lab, a Physical Chemistry lab, an Analytical Instrumentation Laboratory and a combined Analytical/Inorganic Chemistry lab.

Mass Spectrometry Laboratory
A Waters Autospec M high resolution mass spectrometer, a Sciex API triple quadrupole mass spectrometer, and a Bruker Autoflex III MALDI Time-of-Flight mass spectrometer.

Magnetic Resonance Laboratory
Varian INNOVA 300 MHz superconducting FT-NMR spectrometer, Varian INNOVA 500 MHz superconducting FT-NMR spectrometer, and a Varian X-band 12" EPR spectrometer.

Analytical Instrumentation Laboratory
The open-access departmental Analytical Instrumentation Laboratory includes two Perkin-Elmer (PE) Spectrum One Fourier-transform infrared absorption spectrometers each with a universal diamond ATR accessory, a PE Lambda-35 UV/visible spectrometer, a PE Lambda-950 UV/visible/NIR spectrometer with a 60-mm-diameter diffuse reflectance integrating sphere, a PE model 343 polarimeter, a PE LS55B luminescence spectrometer, a PE Clarus 500 capillary-column GC with dual FID

detectors, a Clarus 500 capillary-column GC/MS system (with electron impact capability), a PE Series 200 Quaternary HPLC development system with UV/visible photodiode array detector, a PE Series 200 binary HPLC system interfaced to a Sciex 2000 triple quadrupole MS detector, a PE Series 2000 binary gel permeation chromatography system with refractive index detector, and a Varian AA240FS flame atomic absorption spectrometer equipped with a GTA 120 graphite furnace accessory.

Atomic Force Microscopy
The department has a Veeco multimode Atomic force microscopy (AFM) for research and education. AFM, also called scanning force microscopy (SFM), is one of the foremost tools for imaging, measuring, and manipulating matter at the nanoscale. It is when a fine tip is scanned across a surface the tip-surface force is measured to provide topographic, frictional, and adhesion information of a surface. With the ability to perform non-invasive, high-resolution surface imaging and force measurement, AFM has become an essential characterization tool in multiple disciplines in life science, biomedical engineering, nanoengineering, chemistry, materials science, and other related fields.

Other Departmental Facilities
The department has a VEECO INNOVA N3 Multimode scanning probe microscope and also maintains a computational chemistry laboratory equipped with nine Dell Optiplex 620 computers running Hyperchem v 8.0. Research laboratories for each of the department faculty members are located in Disque and Stratton Halls. Instrumentation available in the research laboratories is described on individual faculty web pages. Additional full-time support includes an instrument specialist (for NMR and MS), a glassblower (Chemistry Department), two electronics specialists (College of Arts & Sciences Electronics Shop), and four machinists (Drexel University Machine Shop).

Chemistry Faculty

Anthony W. Addison, PhD *(University of Kent at Canterbury, England).* Professor. Design and synthesis of novel biomimetic and oligonuclear chelates of copper, nickel, iron, ruthenium and vanadium; their interpretation by magnetochemical, electrochemical and spectroscopic methods, including electron spin resonance; CD and ESR spectroscopy and kinetics for elucidation of molecular architecture of derivatives (including NO) of oxygen-binding and electron-transfer heme- and non-heme iron metalloproteins of vertebrate and invertebrate origins; energy-transfer by Ru, Ir and lanthanide-containing molecules and assemblies.

Jason Cross, PhD. Assistant Teaching Professor.

Peter DeCarlo, PhD *(University of Colorado).* Assistant Professor. Outdoor air quality, particulate matter size and composition instrumentation and measurements, source apportionment of ambient particulate matter, climate impacts of particulate matter.

Aaron T. Fafarman, PhD *(Stanford University).* Assistant Professor. Colloidal nanocrystals; solution-processed solar cells; electrical and spectroscopic characterization of nanomaterials.

Fraser Fleming, PhD *(University of British Columbia (Canada)) Department Head, Chemistry.* Professor. Nitriles, Isonitriles, Stereochemistry, Organometallics

Joe P. Foley, PhD *(University of Florida) Associate Department Head.* Professor. Separation science, especially the fundamentals and biomedical/pharmaceutical applications of the following voltage- or pressure-driven separation techniques: capillary electrophoresis (CE), electrokinetic chromatography, supercritical fluid chromatography, and

high-performance and two-dimensional liquid chromatography (LC). Within these techniques, we explore novel separation modes (e.g., dual-opposite-injection CE and sequential elution LC), novel surfactant aggregate pseudophases, and chiral separations.

Lee Hoffman, PhD *(Flinders University, Adelaide, South Australia).* Assistant Teaching Professor. Interfacial studies on the self-assembly of natural organic materials, understanding the nature of each component, and development of a mechanism describing this process;Dendrimer/ metal nanocomposite design and synthesis hosting metal nanoparticles, utilizing the multivalent dendritic polymer architecture for further exploitation with other molecules such as antibodies and other targeting species.

Monica Ilies, PhD *(Polytechnic University of Bucharest).* Assistant Teaching Professor.

Haifeng Frank Ji, PhD *(Chinese Academy of Sciences).* Professor. Micromechancial sensors for biological and environmental applications; nanomechanical drug screening technology; drug discovery; nanotechnology for energy applications.

Daniel B. King, PhD *(University of Miami).* Associate Professor. Assessment of active learning methods and technology in chemistry courses; incorporation of environmental data into chemistry classroom modules; development of hands-on activities and laboratory experiments.

Daniel A. Kleier, PhD *(University of Notre Dame).* Associate Teaching Professor.

Molly O'Connor, PhD *(Drexel University).* Assistant Teaching Professor. Synthesis and characterization of chiral and achiral metal complexes with novel multidentate ligands.

Kevin G. Owens, PhD *(Indiana University).* Associate Professor. Mass spectrometry research, including the development of sample preparation techniques for quantitative analysis and mass spectrometric imaging using matrix-assisted laser desorption/ionization (MALDI) time-of-flight mass spectrometry (TOFMS) techniques for both biological and synthetic polymer systems, the development of laser spectroscopic techniques for combustion analysis, and the development of correlation analysis and other chemometric techniques for automating the analysis of mass spectral information.

Lynn S. Penn, PhD *(Bryn Mawr College).* Professor. Surface modification for specific applications: chemically derivatize metal and ceramic solid surfaces; designing and executing sequential chemical processes, building complex and layered structures on surfaces, with specific focus on behavior of polymer brushes (investigating the fundamental transport-selective behavior of polymer brushes because of potential in drug delivery, biomedical devices and as an explanation of some biological processes).

Susan A. Rutkowsky, PhD *(Drexel University).* Assistant Teaching Professor.

Louis Scerbo, PhD *(Oregon State University at Corvallis).* Associate Professor. Membrane structures and function.

Reinhard Schweitzer-Stenner, PhD *(Universitat Bremen (Germany)).* Professor. Exploring conformational ensembles of unfolded or partially folded peptides and proteins; determining the parameters governing peptide self-aggregation; structure and function of heme proteins;

investigating protein-membrane interactions; use of IR, VCD, Raman, NMR and absorption spectroscopy for structure analysis.

Karl Sohlberg, PhD *(University of Delaware)*. Associate Professor. Computational and theoretical materials-related chemistry: (1) complex catalytic materials; (2) mechanical and electrical molecular devices.

Peter A. Wade, PhD *(Purdue University)*. Associate Professor. Exploration of a newly discovered [3,3]-sigmatropic rearrangement in which O-allyl nitronic esters are thermally converted to #,#-unsaturated nitro compounds; development and exploitation of a carbon-based hemiacetal mimic; and exploration of cycloaddition reactions involving nitroethylene derivatives and novel nitrile oxides.

Anthony Wambsgans, PhD *(Rice University)*. Associate Teaching Professor.

Jun Xi, PhD *(Cornell University)*. Associate Teaching Professor. Biomacromolecular interactions both in solution and in confined environment; mechanisms of DNA replication and DNA repair; structure and function of molecular chaperones; drug target identification and new therapeutic development; single molecule enzymology; DNA directed organic synthesis.

Emeritus Faculty

Amar Nath, PhD *(Moscow State University, Moscow USSR)*. Professor Emeritus.

Communication, Culture and Media

Major: Communication, Culture and Media
Degrees Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 90.0 (Post-Bachelors) or 45.0 (Post-Masters)
Classification of Instructional Programs (CIP) code: 09.0102
Standard Occupational Classification (SOC) code: 25-1122

About the Program

The PhD program in Communication, Culture and Media develops innovative scholar-teachers who know how to impart theories and studies on the interaction of social forces and communication. Our graduates are trained as committed researchers in quantitative and qualitative approaches to communication study. The program also encourages interdisciplinary approaches to the study of communication and media through faculty strengths in anthropology, communication, linguistics and sociology.

Click here for more information about the Master of Science (MS) in Communication (p. 289).

Additional Information

Visit the Department of Communication (http://www.drexel.edu/coas/academics/departments-centers/communication) website for more information.

Admission Requirements

Applicants to the PhD program will be evaluated by the Department's Graduate Committee for admission to the program. Prospective students must submit with their application:

- a 1,500 word statement of purpose
- three letters of recommendation
- transcripts of all college-level coursework
- GRE scores
- for international students where English is not the official language, TOEFL or other English language proficiency scores are also required. For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/grad/resources/international) page.

Minimum criteria include:

- Completion of a BA or BS degree in an appropriate field
- GPA of 3.0 or higher (preferred GPA 3.5 for courses in the major)
- For international students, a TOEFL score of 600 (100 iBT) or equivalent.

Students entering the program with a Master's degree or with some graduate credit will be evaluated by the Graduate Committee as to how many of their courses could possibly be counted toward the PhD. Students entering with an MS in an appropriate field are required by the university to take a minimum of 15 credit hours in the PhD program before being eligible to take qualifying exams.

For additional information on how to apply, visit the Drexel University Requirements for Admissions (http://www.drexel.edu/grad/programs/coas) page.

Degree Requirements

The PhD requires a minimum of 90.0 credits beyond a Bachelor's degree, including 45.0 credit hours of coursework prior to taking qualifying exams, 15.0 credit hours of coursework after exams, and 30.0 hours of research credits.

The PhD coursework is structured around a set of required core courses, a set of required seminars with rotating topics, and electives in graduate communication lecture courses, independent study work, and dissertation credit.

All students in the program take five common core courses. They then take no less than five courses chosen from Com 800 level seminar offerings. Students are encouraged to take additional seminars after meeting that requirement, since seminar courses enable collaborative relationships with professors and introduce students to the scholarly community.

After completing the core requirements and a sequence of seminars, students are expected to take a minimum of 10 additional courses from existing graduate level lecture courses (depending on their interests and research needs). Students may take up to two graduate courses (six credits) outside the department. Additional credits to meet the 90.0 credit requirements will come from independent study and dissertation credits.

Student advising will include appointments with both graduate director and an assigned mentor during the first two weeks of fall courses, where an individualized plan of study (University form D1) will be completed and approved by the program director.

Core Courses

COM 701	Contemporary Social Theory	3.0
COM 702	Communication Theory I	3.0
COM 703	Communication Theory II	3.0

COM 704	Research Methods in Communication	3.0
COM 705	Data Analysis in Communication	3.0
Seminars		
Students select 15 credits from the five categories of seminars [*]		
COM 801	Seminar in Contemporary Theory	3.0
COM 802	Seminar in Discourse and Semiotics	3.0
COM 803	Seminar in Structural and Cultural Dynamics	3.0
COM 804	Seminar in Research Methodology	3.0
COM 805	Seminar in Communication Ethics	3.0
Communication Lecture Electives		30.0
Ten courses are required, for a total of 30.0 credit hours of electives. These may be chosen from COM 500 to 800 level courses, including 800 level seminars that are a different topic from earlier courses taken.		
Dissertation Credits/Additional Electives [**]		30.0
COM 799	Course COM 799 Not Found	
For the dissertation, students work with a principal advisor, one of the Culture and Communication Department faculty, and no less than two additional faculty from within the department. Students must find one additional outside reader, and students may bring in up to two outside readers.		
Total Credits		**90.0**

[*] There are five categories of seminar: one in which students learn advanced work and influences on a specific theorist or theoretical school; one in which students learn about theories of language, discourse and the sign; one that teaches the paradigm of structural dynamics central to social sciences theory and research; one in which students study a research methods approach; and one that deals with approaches to research ethics. Students must take a seminar in each area (COM 801, COM 802, COM 803, COM 804, COM 805). Seminars can be repeated, with a maximum of three courses taken in each area, as long as the subject covered is different each time.

[**] Students may take up to two graduate-level courses outside of the Department of Culture and Communication.

Qualifying Examinations

After students have completed 45.0 credits, which will usually be at the end of their 6th term, they will be required to take a qualifying examination. The qualifying exam includes of three parts: theory, methods and a content area. Students will be given the grade of fail, pass or high pass on the exam. A grade of pass in all three sections of the exam will be required to qualify for the PhD. Students who do not pass one out of three sections of the exam on the first attempt may retake the section that they failed one time to qualify for the PhD. If they do not pass the second time they take the failed section of the exam they will be dismissed from the program. When a student passes all three sections of the exam, the proper paperwork will be filed with the university graduate office and they will be advanced to candidacy.

Dissertation Defense

Students should defend the dissertation and graduate towards the end of their fourth or fifth year, depending on whether they entered the program with a Masters degree.

Visit the Department of Communication (http://drexel.edu/coas/academics/departments-centers/communication) website for more information.

Environmental Science

Major: Environmental Science
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 03.0104
Standard Occupational Classification (SOC) code: 19-2041

About the Program

Environmental science is a multidisciplinary field in which we try to understand environmental problems and find solutions to them. This field requires understanding of a number of disciplines.

The program's areas of focus include: ecology, biodiversity, conservation, environmental chemistry and assessment, and paleoecology-geology. A student may alternatively craft a specialized plan of study outside of these strength areas under the guidance of an academic advisor.

The master's degree may be completed with either a thesis or non-thesis option. Those choosing to prepare a thesis must complete 45.0 credits (up to 12.0 credits may be research). Students choosing the non-thesis option must complete coursework totaling 45.0 credits (6.0 of which may be research). Most courses carry three credits.

Part-time Study

The MS degree may be completed on a part-time basis. Most courses are scheduled in the late afternoon and evening, usually on a rotating basis from year to year. Part-time students should plan to take courses in the appropriate sequence to comply with the necessary prerequisites. Scheduling of course is dependent on student demand and faculty resources; however, most prescribed courses are offered at least once every other year (schedules are published each term). Required courses should be taken at the first opportunity.

Additional Information

For more information, visit the Department of Biodiversity, Earth & Environmental Science (http://drexel.edu/coas/academics/departments-centers/bees) website.

Susan Cole is the Graduate Coordinator for Environmental Science. Susan Cole can be reached by telephone at 215.895.2905 or e-mail at coless@drexel.edu.

Admission Requirements

In addition to the general entrance requirements for all applicants, entrance to the MS Program in Environmental Science requires a bachelor of science degree in science, mathematics, or engineering. Minimally, students must have completed a year each of calculus, general biology, general chemistry, physics, and, preferably, a semester of organic chemistry.

PhD Program

Applicants to the doctoral program are judged on the basis of academic excellence and the alignment of their research interests with those of

the faculty in the department. Prospective PhD students are welcome to contact the program to discuss their research interests.

Additional information about how to apply is available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/coas/environmental-science) website.

Degree Requirements: MS in Environmental Science

The Master of Science in Environmental Science (MSES) program requires three core courses that form the basis for further specialization. Students choose to complete the remainder of the program with elective courses based on interest. 45.0 total credits are required for program completion.

Core Courses

ENVS 501	Chemistry of the Environment	3.0
ENVS 506	Biostatistics	3.0
ENVS 511	Evolutionary Ecology	3.0
ENVS electives		36.0
Total Credits		**45.0**

Elective Areas

Please see Course Descriptions for a list of Environmental Science (ENVS) electives. Students may also take Environmental Policy (ENVP) and Environmental Engineering (ENVE) courses with prerequisites. Other departmental courses with approval.

Degree Requirements: PhD in Environmental Science

The following general requirements must be satisfied in order to complete the PhD program in Environmental Science:

- 90.0 (post-bachelor's) or 45.0 (post-master's) quarter credits
- qualifying exam
- establishing a plan of study
- 3 core courses recommended, not required
- additional courses dependent on advisor or committee recommendations
- candidacy exam/approval of dissertation proposal
- dissertation/thesis
- defense of dissertation/thesis
- a graduate research seminar presentation once a year for second, third, and fourth-year students.

Thesis Advisor/Plan of Study

For students admitted without an identified Thesis Advisor, the Thesis Advisor must be selected by the end of Winter term in the first year. All students are asked to submit a Plan of Study (that has been agreed upon by Thesis Advisor and student) by the end of Winter term first year. It is anticipated that the graduate coursework will be completed during the first two years or less. Generally there is no prescribed coursework -- students must take courses needed to complete their research under guidance of an faculty advisor.

Curriculum

The following courses are *recommended,* but not required:

ENVS 501 Chemistry of the Environment
ENVS 506 Biostatistics
ENVS 511 Evolutionary Ecology

Candidacy Examination

The function of the Candidacy Examination is to test the breadth and the depth of the student's capabilities in their chosen area of study. The graduate student becomes a PhD c*andidate* only after successfully completing the Candidacy Examination and completing 15 or 45 credits (for post-master's or post-bachelor's degree students, respectively). The candidacy exam is comprised of three parts whose order will be determined by the Candidacy Committee: written examination (or qualifying exam), dissertation research proposal, and oral examination.

Students entering the program with a master's degree are expected to complete the candidacy examination by the end of the summer quarter of their first year. Students entering the PhD program with a bachelor's degree are expected to complete this examination by the end of the summer quarter of their second year.

Thesis/Dissertation and Defense of Thesis/Dissertation

The student will finalize their dissertation only after approval to write is granted by the Dissertation Research Committee. Approval is based upon an evaluation of the breadth and depth of original research being conducted by the student. The dissertation must follow the format specifications set forth in the Drexel's Office of Research and Graduate College of Drexel University (http://www.drexel.edu/graduatecollege). Research conducted for the dissertation must be presented in a lecture open to the public and then defended, privately, before the student's Dissertation Research Committee.

Facilities

Facilities include fully equipped research laboratories in microbiology, ecology, hydrology, and chemistry. Field ecology research augments lab facilities with field-specific equipment, including two boats (14- and 25-foot) and vans with towing capacity. A full range of sampling equipment exists in the department from seine nets, sediment dredges and coring devices, water sampling bottles, flow meters and acoustic tracking devices. Some additional research facilities in environmental biotechnology, chemistry and atmospheric engineering are located in other locations on Drexel's campus.

Among the equipment available for student research are atomic absorption spectrophotometers, UV-visible spectrophotometers, gas-liquid chromatographs, ion chromatograph, ICP-Mass Spectrometer, GC-Mass Spectrometer, high performance liquid chromatographs, total organic carbon analyzer, elemental analyzer for carbon and nitrogen, stable isotope mass spectrometer, high-speed refrigerated centrifuge, nutrient analyzers, and UV photochemical reactor. In addition, the department and university have various microscopes including a scanning electron microscope (SEM). Within the department and in the Department of Biology there is a large capacity for genomics including preparatory equipment for DNA extraction and enhancement.

Drexel University is a national leader in the use of computers for educational and research functions. Several facilities on campus are available for student use.

Biodiversity, Earth and Environmental Science Faculty

Walter F. Bien, PhD *(Drexel University) Director, Laboratory of Pinelands Research*. Research Professor. Natural resource management, restoration ecology, conservation biology, and New Jersey Pinelands community dynamics.

Elizabeth Burke Watson, PhD *(University of California, Berkeley)*. Assistant Professor. The implications of global and regional environmental change, and unraveling the interacting effects of multiple anthropogenic stressors on coastal ecosystems to promote more informed management, conservation, and restoration.

Donald F. Charles, PhD *(Indiana University) Senior Scientist and Section Leader, Phycology Section, Academy of Natural Sciences*. Professor. Diatoms as water quality indicators; paleolimnological approaches for inferring change in biology and chemistry of lakes; lake management; assessment of perturbations in aquatic ecosystems due to municipal and industrial effluents, land-use change, acid deposition, eutrophication and climate change.

Ted Daeschler, PhD *(University of Pennsylvania) Associate Curator of Vertebrate Zoology; Vice President for Systematic Biology and the Library: Academy of Natural Sciences*. Associate Professor. Vertebrate fauna of the Late Devonian Period in eastern North America; fossil collecting; systematic work focusing on freshwater vertebrates; nature of early non-marine ecosystems.

Daniel P. Duran, PhD *(Vanderbilt University)*. Assistant Teaching Professor. Phylogeography, systematics and taxonomy, population and conservation genetics, ecological niche modeling, focusing on insect systems to better understand fundamental evolutionary processes and maintain biodiversity.

Jon Gelhaus, PhD *(University of Kansas) Curator, Department of Entomology: Academy of Natural Sciences*. Professor. Systematic expertise in crane flies (Tipuloidea); phylogenetic reconstruction; historical and ecological biogeography; biodiversity measures and evolution of morphological character systems.

Richard J. Horwitz, PhD *(University of Chicago) Senior Scientist; Fisheries Section Leader; Ruth Patrick Chair of Environmental Sciences*. Associate Professor. Reproductive ecology, life history and distribution of freshwater fishes; effects of land use, habitat structure and hydrology on population dynamics and species composition in aquatic systems; ecological modeling and biometry; anthropogenic contaminants in fishes.

Susan S. Kilham, PhD *(Duke University)*. Professor. Aquatic ecology: phytoplankton; physiological ecology, especially of diatoms in freshwater and marine systems; large lakes; food webs; biogeochemistry.

Danielle Kreeger, PhD *(Oregon State University)*. Research Associate Professor. Trophic interactions in aquatic ecosystems.

Tatyana Livshultz, PhD *(Cornell University) Assistant Curator of Botany*. Assistant Professor. Expertise of the milkweed and dogbane family (Apocynaceae); evolution and species diversity of the genus Dischidia; differences in floral form and function.

Richard McCourt, PhD *(University of Arizona) Associate Curator of Botany, Academy of Natural Sciences of Drexel University; 2010-2012: Program Director, Division of Graduate Education, National Science Foundation. .* Professor. Biodiversity, evolution, ecology, and systematic of green algae, specifically charophyte algae.

Jerry V. Mead, PhD *(SUNY ESF) Assistant Scientist and Section Leader, Watershed and Systems Ecology Section*. Assistant Research Professor. Spatial modeling of aquatic ecosystems; bioenergetics of aquatic invertebrates and fishes; effects of water level management on aquatic organisms; biophysical economics and watershed planning; stream geomorphology and environmental conditions; economics and bioconservation; energy and fisheries.

Michael O'Connor, MD, PhD *(MD, Johns Hopkins University; PhD, Colorado State)*. Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD *(University of Wisconsin-Madison)*. Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions; neurobiology, focusing on brain plasticity and brain evolution in social insects.

Marina Potapova, PhD *(Russian Academy of Sciences) Assistant Curator*. Assistant Professor. Taxonomy, ecology, and biogeography of freshwater diatoms; methods of quantifying morphological characters of diatom frustules based on geometric morphometrics; systematic of monoraphid freshwater diatoms.

Gary Rosenberg, PhD *(Harvard University) Pilsbry Chair of Malacology*. Professor. Magnitude and origin of species-level diversity in the Mollusca.

Jacob Russell, PhD *(University of Arizona)*. Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Ron Smith, MS *(Rutgers University)*. Instructor. Shorebird Ecology and Conservation; Amphibians of the NJ Pine Barrens; Restoration Ecology; Climate Change – Regional Effects and Education

James R. Spotila, PhD *(University of Arkansas) L. D. Betz Chair Professor*. Professor. Physiological and biophysical ecology, thermoregulation of aquatic vertebrates, biology of sea turtles.

Loyc Vanderkluysen, PhD *(University of Hawaii)*. Assistant Professor. The cyclicity of volcanic eruptions, volcanic degassing processes, and large igneous provinces.

David J. Velinsky, PhD *(Old Dominion University) Department Head, Biodiversity, Earth and Environmental Science*. Professor. Geochemical cycling of organic and inorganic constituents of sediments and waters; Sedimentary diagenesis of major and minor elements; Isotope biogeochemistry of carbon, nitrogen and sulfur in marine and freshwater systems.

Jason Weckstein, PhD *(Louisiana State University) Associate Curator of Ornithology*. Associate Professor. Avian phylogenetics, comparative biology and evolutionary history; biodiversity surveys of birds and their parasites and pathogens; coevolutionary history of birds and their parasites.

Emeritus Faculty

John G. Lundberg, PhD *(University of Michigan).* Professor Emeritus. Diversity and diversification of fishes; documenting and interpreting the morphological, molecular, and taxonomic diversity of living and fossil fishes in the interrelated fields of systematic, faunistics and biogeography and paleobiology; exploration and collecting in poorly-known tropical freshwater habitats and regions.

Daniel Otte, PhD *(University of Michigan) Senior Curator, Systematics and Evolutionary Biology.* Professor Emeritus. Taxonomy and biogeography of Orthoptera (grasshoppers, crickets, katydids and their relatives).

Joint JD/PhD Law-Psychology Program

Major: Law and Psychology
Degree Awarded: Juris Doctor (JD) and Doctor of Philosophy (PhD)
Calendar Type: Semester and Quarter
Total Credit Hours: 85.0 Semester (JD) and 91.0 Quarter (PhD)
Classification of Instructional Programs (CIP) code: 22.0208
Standard Occupational Classification (SOC) code: 11-9199; 23-1011

About the Program

The Kline School of Law (http://drexel.edu/law) and the Department of Psychology (http://drexel.edu/coas/academics/departments-centers/psychology) in the College of Arts and Sciences offer a joint and integrated JD/PhD Program in Law and Psychology. The program melds two already ongoing successful endeavors, the JD degree in the School of Law and the PhD in clinical psychology in the Department of Psychology. See the JD-PhD Program webpage (http://drexel.edu/coas/academics/graduate-programs/psychology-law) for more information.

Students in the program complete all 85.0 semester credits required for graduation from the law school and all 91.0 quarter credits required to complete the doctorate. The program allows those students who wish to pursue professional degrees in both law and psychology a more efficient plan of study. The program is designed to be completed in seven (7) years, including required psychology practica, a year's internship in an American Psychological Association accredited predoctoral mental health/forensic setting, a master's thesis, a doctoral dissertation, and 20 hours per week of cooperative training and 50 hours of pro bono service in law.

Students who are accepted into the JD/PhD program will receive full tuition remission for all psychology coursework, plus a guaranteed annual stipend that is currently at least $15,000 per year for all six years they are at the university prior to completing the clinical internship. Students with outstanding LSAT scores are eligible for full tuition remission from the School of Law.

For information on the Admissions process, visit the JD/PhD Application Instructions (http://drexel.edu/coas/academics/graduate-programs/psychology-law/application-instructions) page.

Philosophy

The program bridges the gap between legal and psychological training. By and large, lawyers and social scientists come from different cultures, with different interests, different cognitive approaches to solving problems, different research methodologies, and different attitudes toward confrontation and argument. Each profession arrives at the "truth" in different ways, and its members are exposed to different styles of education during their post-baccalaureate training. Legal education develops an understanding of case analysis, statutory interpretation, the evolution of legal traditions, and methods for resolving disputes. Education in psychology develops research and clinical skills and understanding of behavioral theories, techniques, and statistical methods. Law, which has special rules concerning evidence and proof, relies heavily on precedent and the application of legal principles to specific facts toward the goal of settling conflicts that need immediate resolution. By contrast, psychology looks at problems through an empirical lens, using psychometrically-based tools and techniques to systematically evaluate questions, but rarely reaching a "final verdict." Because the limits of evidence and the meaning of "proof" in psychological research may differ sharply from the limits of evidence and proof in law, conflict may result when the two disciplines interact.

Goals

Within the broad framework of the program's philosophy, the JD/PhD Program in Law & Psychology has three specific goals:

- Develop scientist-practitioners who will produce legally sophisticated social science research to aid the legal system to make better empirically-based decisions;
- Produce lawyer-psychologists who will participate in the development of more empirically and theoretically sophisticated mental health policy by legislatures, administrative tribunals, and the courts; and
- Educate highly trained clinicians who can contribute to the advancement of forensic psychology in such areas as criminal law, domestic relations, and civil commitment.

In fulfilling these goals, the program trains students in an integrated and conceptually unified curriculum so they acquire a mature understanding of the interaction between the two disciplines.

Curriculum

Students attend the School of Law and the Department of Psychology simultaneously for six years, integrating course work in both disciplines each year. Students maintain continuous contact with the faculties of both schools and the developments in both disciplines over the course of each year.

In the seventh year, after obtaining the JD, students undertake a year-long supervised internship and complete their doctoral dissertation. They are awarded the PhD at the end of their seventh year.

Training consists of seven elements:

- The required existing core program in law and psychology at both schools;
- Interdisciplinary courses; e.g., Mental Health Law, Behavioral Sciences and the Law, Expert Witnesses, Law and the Mind Sciences;
- Supervised psycholegal research experience on teams of students' faculty mentors;
- Legal clinics and psychology practica and internships that combine knowledge from both fields in a practical setting;
- Electives in both fields, e.g., bioethics, education law, health law, health psychology, employment discrimination, neuropsychology;
- Cooperative experience and pro bono service in legal settings; and

- Employment for at least one summer in a legal setting, e.g., public interest law firm, governmental agency, private law firm, nonprofit association.

Environmental Policy

Major: Environmental Policy
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 03.0201
Standard Occupational Classification (SOC) code: 19-1031

About the Program

The Master of Science in Environmental Policy program provides a comprehensive, multi-disciplinary approach to the development, implementation and evaluation of environmental policy. The program prepares students for careers as policy analysts who have a strong commitment to environmental values, are scientifically and methodologically competent, and can work effectively in the policy process with the various groups and institutions engaged in environmental issues.

To earn the degree, students must complete 45.0 credits of coursework designed to teach:

- knowledge of how policies are developed and implemented;
- the scientific and engineering basis of environmental policies;
- best practices in environmental policies at local, federal and international levels;
- an understanding of who the key players are in environmental politics, and how to work with them to accomplish environmental improvements.

For more information about this program, visit the MS in Environmental Policy (http://drexel.edu/coas/academics/graduate-programs/environmental-policy) page.

Admission Requirements

Environmental policy applicants must meet the general requirements for admission to graduate studies at Drexel University. The application also requires a personal statement (up to 500 words) describing the prospective student's interest in environmental policy. Entering students typically begin study during the fall quarter. Students are able, though, to start the program during any quarter.

For additional information on how to apply, visit Drexel's Admissions page for Environmental Policy (http://www.drexel.edu/grad/programs/coas/environmental-policy).

Degree Requirements

Core Courses *

ENVP 502	Research Methods	3.0
ENVP 650	Political Economy of Resources & the Environment	3.0
ENVP 572	Environmental Policy	3.0
Environmental Policy Electives		36.0
Recommended Courses:		
COM 705	Data Analysis in Communication	
ENVP 522	Environmental Law	
ENVP 523	Environmental Regulations	
ENVP 550	International Climate Finance	
ENVP 552	Political Economy of Climate Change	
ENVP T580	Special Topics in ENVP	
ENVP 720	Environmental Cost-Benefit Analysis	
ENVP 760	Social Change & Environment	
ENVP 798	Master's Project	
ENVP I799	Independent Study in ENVP	
ENVP 865	Special Topics	
ENVP 870	Human Dimensions of Global Climate Change	
ENVP 875	Environmental Justice	
ENVP 880	Environment and Society	
ENVS 501	Chemistry of the Environment	
ENVS 506	Biostatistics	
ENVS 528	Conservation Biology	
ENVS 708	Environmental GIS	
ENVS 726	Environmental Assessment	
ENVP T880	Special Topics in ENVP	
PLCY 503	Theory and Practice of Policy Analysis	
PLCY 504	Methods of Policy Analysis	
PLCY 506	Institutional Dynamics of the Policy Process	
PLCY 509	Sustainability & Public Policy	
PBHL 520	Principles of Biostatistics	
PBHL 701	Introduction to Descriptive Epidemiology and Biostatistics	
SCTS 571	Science and Technology Policy	
SCTS 641	Risk and Disaster Policy	
STAT 601	Business Statistics	
Total Credits		**45.0**

* Within the first quarter of study, a student must meet with an assigned advisor and work out a plan of study.

Public Policy

Major: Public Policy
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 44.0501
Standard Occupational Classification (SOC) code: 11-1031; 19-3094

About the Program

The Master of Science in Public Policy program is a general professional masters degree designed for people who work, or who would like to work, for government or a nonprofit organization.

The program has a required core curriculum of nine courses, specifically designed for students to:

- develop an understanding of the social, political and ethical context of policy research, and how this understanding can be applied to an applied practice of policy analysis;
- conceptualize, design and conduct social research for policy purposes, as well as comprehensively analyze existing social research data;

- recognize the history of public policy institutions in America and the management and governance of nonprofit organizations; and
- understand the concept of sustainability as it relates to policy planning, design, and implementation.

In addition to the core courses, the program has a focus on case study research as a unifying element of the curriculum. The curriculum reinforces coursework with a series of accompanying 1-credit, online, Case Study Research co-requisites. Students are required to choose a specific case study topic that they will work on for the duration of the core curriculum. In each subsequent Case Study Research course, students continue further research and writing on their chosen case study topic. Thus by the end of the program students will have produced a polished, in-depth analysis of a specific case that they can use to demonstrate expertise in a given policy area.

With the approval and support of the program director, students can craft a specialized course of study with their three electives, or they can take courses in the following:

- Educational Policy
- Science and Technology Policy
- Information Policy
- Environmental Policy
- City Management and Governance

For additional information, view the Center for Public Policy (http://drexel.edu/coas/academics/departments-centers/public-policy) page on the College of Arts and Sciences' website.

Admission Requirements

Acceptance for graduate study at Drexel University requires a four-year bachelor's degree from an accredited institution in the United States or an equivalent international institution. Although admission requirements vary by program, regular acceptance typically requires a minimum grade point average (GPA) of 3.0 for the last two years of undergraduate work. The GPA for any graduate work must be at least 3.0.

The admission committee evaluates all credentials submitted by applicants to determine a student's ability and potential to succeed in graduate study. In addition, the committee is interested in the applicant's ability to contribute to his/her program of study and to the University community as a whole.

Though part-time at 8.0 credits, Drexel is extending the same scholarship opportunities to Master of Science in Public Policy students who enroll that are usually only available for full-time programs.

Visit the Graduate Admissions (http://www.drexel.edu/grad/programs/coas) website for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

Required Courses

BUSN 502	Essentials of Economics	3.0
ECON 616	Public Finance and Cost Benefit Analysis	3.0
Take one of the following courses		3.0
STAT 601	Business Statistics	
STAT 610	Statistics for Business Analytics	
Take one of the following courses		3.0

ECON 550	Econometrics	
COM 705	Data Analysis in Communication	
INFO 680	US Government Information	3.0
PLCY 503	Theory and Practice of Policy Analysis	3.0
PLCY 504	Methods of Policy Analysis	3.0
PLCY 506	Institutional Dynamics of the Policy Process	3.0
PLCY 507	Nonprofit Organizations	3.0
Case Study Courses		**9.0**

The curriculum reinforces coursework with a series of accompanying 1-credit, online, Case Study Research courses. In the first, students are introduced to case study methodology and practice, and required to choose a specific case that they will work on for the duration of the core curriculum. In each subsequent Case Study Research course, students continue further research and writing on their chosen case study topic. Thus by the end of the program students have produced a polished, in-depth analysis of a specific case that they can use to demonstrate expertise in a given policy area.

PLCY 510	Introduction to Case Study Research	
PLCY 511	Case Study Literature Review	
PLCY 512	Case Study Document Review	
PLCY 513	Case Study Interviews	
PLCY 515	Case Study Colloquium	
PLCY 516	Case Study Research II (1-credit course taken 3 times)	
PLCY 517	Case Study Final Project	
Elective Courses		**9.0**

Elective courses are taught under the PLCY 590: Special Topics in Public Policy, or one of the participating departments. Students are required to take three 3-credit graduate level courses to fulfill the electives requirement. Public Policy students are able to select any graduate level courses (pending department approval) to create an electives "track" based on their own interests. Students have taken this opportunity to explore areas such as Education Policy, Environmental Policy and Urban Systems.

PLCY 509	Sustainability & Public Policy	
PLCY 590	Course PLCY 590 Not Found	
Total Credits		**45.0**

Science, Technology, and Society

Major: Science, Technology, and Society
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 30.1501
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The Science, Technology, and Society (STS) program systemically investigates the social dimensions of science, technology and medicine. Faculty from a range of disciplines contribute to a curriculum that features a broad set of perspectives, all grounded in a foundation of critical thinking, research methods, and writing and presentation skills. The STS program emphasizes three interrelated areas: environment and sustainability; health and medicine; and information, identities and networks. The STS Lab course is a unique feature of the curriculum— it prepares students to work as a team to address meaningful science

and technology related topics. Working with a faculty adviser, graduate students develop an individualized plan of study that allows them to pursue their interests in depth.

STS students are independent, out-of-the-box thinkers who are dedicated to understanding the intersections of society, science, medicine and technology. While STS students vary widely in their professional and educational backgrounds and career ambitions, they share a common commitment to a critical approach to our world's most pressing technoscientific challenges.

Prospective students for the MS in STS see this educational opportunity as a crucial factor in their skill development and career advancement. They are recent college graduates in the social sciences, humanities, natural sciences, and engineering; middle and high school teachers; and professionals in businesses, city and state government offices, and area hospitals. Students can attend full time or part time and complete all coursework in the evening.

For additional information, visit the Master's Program in Science, Technology, and Society (http://drexel.edu/coas/academics/graduate-programs/science-technology-society) web page.

Admission Requirements

Applicants to the program must meet the general requirements for admission to graduate studies at Drexel University.

Prospective students must also submit a 500-word essay explaining why they want to enter the program and some of the issues related to science, technology and society that they would like to study. These statements are read carefully by the faculty screening committee to evaluate each applicant's sense of purpose. Entering students typically begin during the fall quarter. Students are able, though, to start the program during any quarter.

Visit the Graduate Admissions (http://www.drexel.edu/grad/programs/coas/science-technology-society) website for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

The program requires 45.0 credits of coursework. Required courses total 24.0 credits. Remaining credits are chosen from a list of electives.

Basic Requirements

SCTS 501	Introduction to Science, Technology and Society	3.0
SCTS 502	Research Methods	3.0
SCTS 503	Advanced Research Methods	3.0
SCTS 504	Science, Technology & Society Theories	3.0
Advanced Requirements		
Ethics, Values, Identities, and Culture		6.0
Select two of the following:		
SCTS 600	Contemporary Feminist Theory	
SCTS 610	Material Culture	
SCTS 612	Medical and Healthcare Ethics	
SCTS 614	Technology, Progress, and Determinism	
SCTS 615	The Biopolitics of Health	
SCTS 620	Medicine, Technology and Science	
SCTS 650	Global Subjects of Biocapital	
SCTS 651	Transnational Science & Technology	

INFO 679	Information Ethics	
PBHL 824	Public Health Ethics	
Science and Technology Policy		3.0
Select one of the following:		
SCTS 570	Environmental Policy	
SCTS 571	Science and Technology Policy	
SCTS 641	Risk and Disaster Policy	
SCTS 643	Contemporary Stem Workforces:Organizations of Labor in Lab, Shop and Clinic	
SCTS 645	War and Technoscience	
COM 650	Telecommunications Policy in the Information Age	
PLCY 509	Sustainability & Public Policy	
INFO 725	Information Policy	
Science, Technology & Society Lab		3.0
Select one of the following:		
SCTS 703	Connected Mobility Lab	
SCTS 705	Identity and Intersectionality	
SCTS 710	Special Topics in Science, Technology and Society Lab	
Thesis and Electives [*]		21.0
SCTS 798	Master's Thesis	
Suggested Electives [**]		
SCTS 584	Historiography of Science	
SCTS 639	Politics of Life	
SCTS 640	STS Perspectives on Risk and Disaster	
SCTS 660	Theoretical and Sociological Aspects of Measurement	
SCTS 665	Advanced Topics in Philosophy of Science	
SCTS 697	Internship in Science, Technology and Society	
SCTS 790	Special Topics in Science, Technology & Society	
SCTS 799	Independent Study in Science, Technology and Society	
COM 690	Course COM 690 Not Found	
COM 701	Contemporary Social Theory	
COM 704	Research Methods in Communication	
COM 705	Data Analysis in Communication	
COM 720	Critical Theory	
COM 801	Seminar in Contemporary Theory	
MGMT 602	Managing Technology Innovation	
PBHL 516	Introduction to Public Health	
PLCY 504	Methods of Policy Analysis	
PSY 612	Psychology of Human-Computer Interaction Design	
PSY 712	History and Systems	
Total Credits		**45.0**

[*] Students who elect to pursue the Thesis option should complete 9.0 credits of SCTS 798 - Master's Thesis and select 12 credits from the list of suggested electives.

[**] Additional electives may be taken from other schools and colleges in the University with approval from the Director of the MS in Science, Technology & Society program.

Mathematics

Major: Mathematics
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS) or 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 27.0101
Standard Occupational Classification (SOC) code: 15-2021; 15-2041

About the Program

The Department of Mathematics is a broadly based academic unit offering instructional programs and carrying on research activities in mathematics. Doctor of Philosophy and Master of Science degrees are offered.

Areas of research specialty among the faculty include applied mathematics, algebraic combinatorics, biomathematics, discrete mathematics, optics, analysis, number theory, numerical analysis, probability and statistics, matrix and operator theory, fluid mechanics, and partial differential equations.

Additional Information

For more information about theses graduate programs, visit Department of Mathematics (http://drexel.edu/coas/academics/graduate-programs/mathematics) webpage.

Admission Requirements

Applicants should hold a BS degree in mathematics or the equivalent and meet the University's graduate admission standards. In particular, the student should have had intensive exposure to proof oriented courses, such as real analysis and abstract algebra. Students requesting financial aid are required to take the Graduate Record Examination General Test. Because many of the core courses are two- or three-term sequences beginning in the fall, new students are typically admitted to the programs only in the fall term. Admissions standards for the MS and PhD programs are equivalent.
For additional information on how to apply, visit Drexel University's Graduate Admissions (http://www.drexel.edu/grad/programs/coas/mathematics) website.

Master of Science in Mathematics

Students must complete a minimum of 45.0 graduate credits for the MS degree. Of these 15 courses, the following six are required:

Required Courses

MATH 504	Linear Algebra & Matrix Analysis	3.0
MATH 505	Principles of Analysis I	3.0
MATH 506	Principles of Analysis II	3.0
MATH 533	Abstract Algebra I	3.0
MATH 630	Complex Variables I	3.0
MATH 633	Real Variables I	3.0

The remaining 9 courses may be any graduate mathematics courses. In some cases, course substitutions may be made with courses from other departments. Elective courses taken outside the department must receive prior departmental approval in order to be counted toward the degree.

There are no thesis, language, or special examination requirements for the master's degree.

Students seeking a dual MS must satisfy core requirements for both degree programs.

Students should note that some departmental courses, such as Advanced Engineering Mathematics, are foundation courses and do not contribute to the departmental requirements for the degree. They do count toward the University requirements for a degree.

PhD in Mathematics

Students must complete a minimum of 45 graduate credits for the PhD degree, in addition to the 45.0 required by the MS program, for a total of 90.0 credits. Of the 45.0 credits of MS program courses, the following six are required:

Required Courses

MATH 504	Linear Algebra & Matrix Analysis	3.0
MATH 505	Principles of Analysis I	3.0
MATH 506	Principles of Analysis II	3.0
MATH 533	Abstract Algebra I	3.0
MATH 630	Complex Variables I	3.0
MATH 633	Real Variables I	3.0

The remaining 27.0 credits, comprising the MS segment of the PhD program, may be any graduate mathematics courses. In some cases, course substitutions may be made with courses from other departments. Elective courses taken outside the department must receive prior departmental approval in order to be counted toward the degree.

The student must pass a written qualifying exam. The student is allowed two attempts. Students must take exam at the end of their first year, and have a second opportunity in September of their second year.

Students must take a PhD candidacy exam at the end of their second year. Additional coursework to reach the 90.0 credits required for the PhD will be agreed upon with the student's Graduate Advisor. Students should note that some departmental courses, such as MATH 544 Advanced Engineering Mathematics, are foundation courses and do not contribute to the departmental requirements for the degree. They do count toward the University requirements for a degree.

Facilities

Department computers are accessible from residence halls over the campus network, and from off-campus via modem or an Internet Service Provider (ISP). Departmental and university networks provide access to the Internet and the Pennsylvania Education Network (PrepNET). Departmental research computers have a connection to the campus backbone at 100 Mbps and are also on the vBNS via a campus OCS ATM connection.

The computing resources of the Mathematics Department include:

- Math Resource Center (Korman 247): 6 Dell Optiplex (Core 2 Duo 2.8 Ghz, 3 GB RAM) running Windows XP Professional SP3.
- Faculty Center (Korman 207): 2 Lenovo ThinkCentre (Pentium 4 3.0 Ghz, 1 GB RAM) running Windows XP Professional SP3.
- Computer Server: One Penguin Server (Dual 2.2. GHz Opteron, 8 GB RAM) running Ubuntu Linux.
- File/Print/Mail/Web Server: 2 Penguin Servers (Dual 2.8 GHz Zeon, 1 GB RAM) running Ubuntu Linux and connected to 600GB RAID

5 Disk over a fully switched gigabit Ethernet network, 2TB mirrored RAID.

Mathematics Faculty

David M. Ambrose, PhD *(Duke University) Associate Department Head, Mathematics.* Associate Professor. Applied analysis and computing for systems of nonlinear partial differential equations, especially free-surface problems in fluid dynamics.

Jason Aran, MS *(Drexel University).* Assistant Teaching Professor.

Jonah D. Blasiak, PhD *(University of California at Berkeley).* Associate Professor. Algebraic combinatorics, representation theory, and complexity theory.

Robert P. Boyer, PhD *(University of Pennsylvania) Associate Head of the Mathematics Department.* Professor. Functional analysis, C*-algebras and the theory of group representations.

Patrick Clarke, PhD *(University of Miami).* Assistant Professor. Homological mirror symmetry, Landau-Ginzburg models, algebraic geometry, symplectic geometry.

Daryl Falco, MS *(Drexel University).* Assistant Teaching Professor. Discrete mathematics and automata theory.

Raymond Favocci, MS *(Drexel University).* Assistant Teaching Professor.

Carlo Fazioli, PhD *(University of Illinois at Chicago).* Assistant Teaching Professor. Computational Fluid Dynamics, Free Boundary Problems.

Pavel Grinfeld, PhD *(Massachusetts Institute of Technology).* Associate Professor. Intersection of physics, engineering, applied mathematics and computational science.

Anatolii Grinshpan, PhD *(University of California at Berkeley).* Assistant Teaching Professor. Function theory and operator theory, harmonic analysis, matrix theory.

Yixin Guo, PhD *(University of Pittsburgh).* Associate Professor. Biomathematics, dynamical systems, ordinary and partial differential equations and math education.

R. Andrew Hicks, PhD *(University of Pennsylvania).* Professor. Geometry; optics; computer vision.

Pawel Hitczenko, PhD *(Warsaw University).* Professor. Probability theory and its applications to analysis, combinatorics, wavelets, and the analysis of algorithms.

Robert Immordino, MS *(Drexel University).* Assistant Teaching Professor.

Ryan Kaliszewski, PhD *(The University of North Carolina at Chapel Hill).* Visiting Assistant Professor. Algebraic Combinatorics and Algebraic Geometry--specifically positivity results for generating polynomials.

Dmitry Kaliuzhnyi-Verbovetskyi, PhD *(Kharkov University).* Associate Professor. Operator theory, systems theory, complex analysis, C*-algebras and harmonic analysis.

Hwan Yong Lee, PhD *(University of Utah).* Assistant Teaching Professor. Electromagnetic wave propagation in composite media, optimization and inverse problem.

Huilan Li, PhD *(York University).* Assistant Teaching Professor. Algebraic combinatorics.

Georgi S. Medvedev, PhD *(Boston University).* Associate Professor. Ordinary and partial differential equations, mathematical neuroscience.

Taoufik Meklachi, PhD *(University of Houston).* Visiting Assistant Professor. Inverse Problems

Jennifer Morse, PhD *(University of California, San Diego) Undergraduate Advisor.* Professor. Algebraic combinatorics.

Shari Moskow, PhD *(Rutgers University) Department Head.* Professor. Partial differential equations and numerical analysis, including homogenization theory, numerical methods for problems with rough coefficients, and inverse problems.

Marna A. Mozeff, MS *(Drexel University).* Associate Teaching Professor.

Oksana P. Odintsova, PhD *(Omsk State University).* Associate Teaching Professor. Math education; geometrical modeling.

Dimitrios Papadopoulos, MS *(Drexel University).* Instructor.

Ronald K. Perline, PhD *(University of California at Berkeley).* Associate Professor. Applied mathematics, numerical analysis, symbolic computation, differential geometry, mathematical physics.

Marci A. Perlstadt, PhD *(University of California at Berkeley).* Associate Professor. Applied mathematics, computed tomography, numerical analysis of function reconstruction, signal processing, combinatorics.

Adam C. Rickert, MS *(Drexel University).* Associate Teaching Professor.

Patricia Henry Russell, MS *(Drexel University).* Teaching Professor. Probability and statistics.

Eric Schmutz, PhD *(University of Pennsylvania).* Professor. Probabilistic combinatorics, asymptotic enumeration.

Li Sheng, PhD *(Rutgers University).* Associate Professor. Discrete optimization, combinatorics, operations research, graph theory and its application in molecular biology, social sciences and communication networks, biostatistics.

Gideon Simpson, PhD *(Columbia University).* Assistant Professor. Partial differential equations, scientific computing and applied mathematics.

Justin R. Smith, PhD *(Courant Institute, New York University).* Professor. Homotopy theory, operad theory, quantum mechanics, quantum computing.

Xiaoming Song, PhD *(University of Kansas).* Assistant Professor. Stochastic Calculus, Large Deviation Theory, Theoretical Statistics, Data Network Modeling and Numerical Analysis.

Jeanne M. Steuber, MS *(Boston University).* Assistant Teaching Professor.

Kenneth P. Swartz, PhD *(Harvard University).* Assistant Teaching Professor. Applied statistics, data analysis, calculus, discrete mathematics, biostatistics.

Vaishalee T. Wadke, MS *(Columbia University).* Instructor.

Richard D. White, MS *(Penn State University)*. Assistant Teaching Professor.

Hugo J. Woerdeman, PhD *(Vrije Universiteit, Amsterdam)*. Professor. Matrix and operator theory, systems theory, signal and image processing, and harmonic analysis.

J. Douglas Wright, PhD *(Boston University) Graduate Advisor*. Associate Professor. Partial differential equations, specifically nonlinear waves and their interactions.

Dennis G. Yang, PhD *(Cornell University)*. Assistant Teaching Professor. Dynamical systems, neurodynamics.

Thomas (Pok-Yin) Yu, PhD *(Stanford University)*. Professor. Multiscale mathematics, wavelets, applied harmonic analysis, subdivision algorithms, nonlinear analysis, applied differential geometry and data analysis.

Emeritus Faculty

Loren N. Argabright, PhD *(University of Washington)*. Professor Emeritus. Functional analysis, wavelets, abstract harmonic analysis, the theory of group representations.

Robert C. Busby, PhD *(University of Pennsylvania)*. Professor Emeritus. Functional analysis, C*-algebras and group representations, computer science.

Ewaugh Finney Fields, EdD *(Temple University) Dean Emeritus*. Professor Emeritus. Mathematics education, curriculum and instruction, minority engineering education.

William M.Y. Goh, PhD *(Ohio State University)*. Associate Professor Emeritus. Number theory, approximation theory and special functions, combinatorics, asymptotic analysis.

Bernard Kolman, PhD *(University of Pennsylvania)*. Professor Emeritus. Lie algebras; theory, applications, and computational techniques; operations research.

Charles J. Mode, PhD *(University of California at Davis)*. Professor Emeritus. Probability and statistics, biostatistics, epidemiology, mathematical demography, data analysis, computer-intensive methods.

Chris Rorres, PhD *(Courant Institute, New York University)*. Professor Emeritus. Applied mathematics, scattering theory, mathematical modeling in biological sciences, solar-collection systems.

Jet Wimp, PhD *(University of Edinburgh)*. Professor Emeritus. Applied mathematics, special factors, approximation theory, numerical techniques, asymptotic analysis.

Physics

Major: Physics
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 40.0801
Standard Occupational Classification (SOC) code: 19-2010

About the Program

The Department of Physics offers opportunities for students to study with leading researchers in astrophysics, biophysics, nonlinear dynamics,

particle physics, and solid state physics, as well as to participate in international collaborations. Coursework for the MS and PhD degrees includes advanced training in core areas of physics and in the topics of current research. PhD students begin research early in the program, commencing thesis work in their second year of study.

To learn more about the graduate program in physics visit the Department of Physics (http://drexel.edu/coas/academics/graduate-programs/physics) webpage.

Admission Requirements

For admission to the graduate programs, a bachelor's degree in an approved program is required with a minimum undergraduate GPA of 3.0/4.0 specified.

The GRE Subject Test is required for PhD applicants to be considered for assistantships.

- minimum Quantitative Score = 150 (650 on previous 800-point scale)
- minimum Verbal Score = 150 (450 on previous 800-point scale).

Students from non-English speaking countries are required to demonstrate proficiency in English via the TOEFL exam. TOEFL scores are required for international applicants or applicants who earned a degree outside the US (minimum scores: 100/600/250). Scores will be reviewed based on section scores and total scores. IELTS scores may be submitted in lieu of TOEFL scores. The minimum IELTS band score is 7.0. Teaching assistants educated in non-English speaking countries must complete a special English program.

Visit the Graduate Admissions (http://www.drexel.edu/grad/programs/coas/physics) website for more information about requirements and deadlines, as well as instructions for applying online.

Master of Science in Physics

Students who wish to complete only the master's degree are welcomed, and will find that the learning environment will allow them to broaden their professional understanding by exploring current topics and trends of physics in an interdisciplinary setting.

There are no thesis, language, or special examination requirements for the master's degree.

The degree requires 45.0 graduate credits, with at least 30.0 credits from the following:

PHYS 501	Mathematical Physics I	3.0
PHYS 502	Mathematical Physics II	3.0
PHYS 506	Dynamics I	3.0
PHYS 511	Electromagnetic Theory I	3.0
PHYS 512	Electromagnetic Theory II	3.0
PHYS 516	Quantum Mechanics I	3.0
PHYS 517	Quantum Mechanics II	3.0
PHYS 518	Quantum Mechanics III	3.0
PHYS 521	Statistical Mechanics I	3.0
PHYS 522	Statistical Mechanics II	3.0

PhD in Physics

90.0 quarter credits

The Department of Physics offers opportunities for students to study with leading researchers in astrophysics, biophysics, nonlinear dynamics, particle physics, and solid state physics, as well as to participate in international collaborations. Coursework for the PhD degree includes advanced training in core areas of physics and topics of current research. PhD students begin research early in the program, commencing thesis work in their second year of study.

The usual schedule for physics graduate students consists of two years of coursework, qualifying exams, and research training, followed by dissertation research. All PhD students follow a common set of ten core courses during their first two years of study. In addition to these core courses, students also take four special topics courses.

PhD students Admitted with Post-Master's Status

Students who are admitted for PhD study with "post-masters" status must take 15.0 credits of graduate coursework with a minimum GPA of 3.0 to become doctoral candidates. Courses are to be chosen in consultation with the Director of Graduate Studies. Post-masters students are expected to pass the written and oral qualifying exams by the end of the Spring quarter of their first year of study. Ordinarily, this means taking the written qualifying exam in September before the start of classes. To be prepared for the oral exam, post-masters students should begin research as soon as possible.

Program Requirements

Doctoral candidates are required to complete a minimum of 45.0 credits of coursework and research work beyond the master's requirement of 45.0 credits while maintaining a minimum of 3.0 GPA.

Core Courses

First Year		
PHYS 501	Mathematical Physics I	3.0
PHYS 506	Dynamics I	3.0
PHYS 502	Mathematical Physics II	3.0
PHYS 516	Quantum Mechanics I	3.0
PHYS 521	Statistical Mechanics I	3.0
PHYS 517	Quantum Mechanics II	3.0
Second Year		
PHYS 522	Statistical Mechanics II	3.0
PHYS 518	Quantum Mechanics III	3.0
PHYS 511	Electromagnetic Theory I	3.0
PHYS 512	Electromagnetic Theory II	3.0
Select four of the following:		12.0
PHYS 531	Galactic Astrophysics	
PHYS 532	Cosmology	
PHYS 561	Biophysics	
PHYS 553	Nanoscience	
PHYS 562	Computational Biophysics	
PHYS 563	Single Molecule Methods	
PHYS 571	Nonlinear Dynamics	
PHYS 576	Introduction to Particle Physics	
PHYS 626	Solid State Physics I	
PHYS 750	Course PHYS 750 Not Found	
Total Credits		**42.0**

Research Training

Students begin research in the first year with two small projects. In the spring quarter, this project culminates in a talk presented to the other students and Director of Graduate Studies. In the summer quarter, the project requires a written report to the research advisor. Research during the second year is toward the oral qualifying exam, described below.

Candidacy Examination

PhD candidates must pass a Candidacy Examination, which consist of two parts: written and oral:

- The written portion of the qualifying examination is given twice a year, during the week before the fall quarter begins and during the first week of classes of the winter term. Students must pass the written qualifying examination no later than the winter quarter of their second year. At most two attempts may be made at passing the exam. The qualifying examination covers four general areas at the advanced undergraduate level: classical mechanics, electricity and magnetism, quantum mechanics, and statistical physics.
- The oral portion of the qualifying exam is based on original research performed by the student, which consists in an oral presentation and a written report of no less than 15 pages, submitted to the examination committee and the Director of Graduate Studies at least one week prior to the exam. Immediately after the public presentation, the Examination Committee will privately conduct an oral examination. This exam must be passed by the end of the second year of study.

Dissertation Defense

This dissertation defense includes a final public presentation and defense of the dissertation. The dissertation must be submitted to the Examination Committee at least two weeks prior to the oral defense. The oral presentation involves a public 45-60 minute presentation by the candidate followed by an unspecified period during which the Examination Committee will ask questions. All doctoral dissertations, in addition to originality and scholarly content, must conform to University format requirements.

Plan of Study (PhD)

The following sample plan of study contains the required courses for full-time PhD students entering without a previous Master's degree. Post-master's students should consult the Director of Graduate Studies.

First Year		
Fall		**Credits**
PHYS 501	Mathematical Physics I	3.0
PHYS 506	Dynamics I	3.0
Special Topics Course[*]		3.0
	Term Credits	**9.0**
Winter		
PHYS 502	Mathematical Physics II	3.0
PHYS 516	Quantum Mechanics I	3.0
Special Topics Course[*]		3.0
	Term Credits	**9.0**
Spring		
PHYS 521	Statistical Mechanics I	3.0

PHYS 517	Quantum Mechanics II	3.0
	Term Credits	**6.0**

Second Year

Fall

PHYS 522	Statistical Mechanics II	3.0
PHYS 518	Quantum Mechanics III	3.0
Special Topics Course*		3.0
	Term Credits	**9.0**

Winter

PHYS 511	Electromagnetic Theory I	3.0
Special Topics Course*		3.0
	Term Credits	**6.0**

Spring

PHYS 512	Electromagnetic Theory II	3.0
PHYS 997	Research	1.0-12.0
	Term Credits	**4.0-15.0**

Total Credit: 43.0-54.0

* Special topics courses are an introduction to current topics of experimental and theoretical interest. They are offered in alternate years.

Academic Year 2013/2014 (odd)

Fall		**Credits**
PHYS 531	Galactic Astrophysics	3.0
PHYS 561	Biophysics	3.0
	Term Credits	**6.0**

Winter		
PHYS 532	Cosmology	3.0
PHYS 562	Computational Biophysics	3.0
	Term Credits	**6.0**

Spring		
PHYS 563	Single Molecule Methods	3.0
PHYS 750	Course PHYS 750 Not Found (Quantum Field Theory)	3.0
	Term Credits	**6.0**

Total Credit: 18.0

Academic Year 2014/2015 (even)

Fall		**Credits**
PHYS 626	Solid State Physics I	3.0
PHYS 576	Introduction to Particle Physics	3.0
	Term Credits	**6.0**

Winter		
PHYS 553	Nanoscience	3.0
PHYS 571	Nonlinear Dynamics	3.0
	Term Credits	**6.0**

Spring		
To be announced		
	Term Credits	**0.0**

Total Credit: 12.0

Additional information for graduate students is available at the Department of Physics (http://www.physics.drexel.edu).

Facilities

Astrophysics Facilities:

- The Numerical Astrophysics Facility emphasizes theoretical and numerical studies of stars, star clusters, the early Universe, galaxy distributions, cosmology modeling, and gravitational lensing. The facility employs special purpose high-performance computers, such as the Gravity Pipeline Engine (GRAPE), a new Beowulf cluster (128 processors, 128G RAM, 2 TB RAID disk), and a system using Graphics Processing Units to achieve computational speeds of up to a trillion floating point operations per second. The Joseph R. Lynch Observatory houses a 16-inch Mead Schmidt-Cassegrain telescope equipped with SBIG CCD camera. Drexel faculty and students are active in analyzing data from the Sloan Digital Survey, which operates a 2.5-m telescope at Apache Point, N.M., and the Large Synoptic Survey Telescope to be built in Chile (first light 2020).

Biophysics Facilities:

- Bio-manipulation and microscopy laboratories. Four optical tables and six research grade microscopes are configured to perform microscopic spectroscopy and manipulation on solutions and individual cells. A spatial light modulator allows spatial patterns to be encoded on samples and explored; all microscopes are temperature controlled with state of the art cameras, including a 2,000 frame per second high speed system. Each optical table is also equipped with high power lasers for photolysis or fluorescence spectroscopy. Microfluidic attachments are present on one table, and in an adjacent laboratory, a small microfluidic fabrication facility has been established.
- Fluorescence microscope to resolve fast biomolecular dynamics in living cells.
- Experimental biophysics lab for studies of proteins and biomimetic lipids.
- The Computational Biophysics facility also includes: (i) a Beowulf cluster with 46 dual Quad-core hyperthreaded Xeon CPU (736 cores) and 12Gb of RAM nodes plus a master with 1Tb of storage and 24Gb of RAM, (ii) a Beowulf cluster with 44 dual-core Xeon CPU (344 cores),(iii) a dual Quad-core hyperthreaded Xeon CPU workstation with 24Gb RAM and 3Tb disk with two Tesla C2050 GPU CUDA-accelerated graphics card, (iv) a dual Quad-core hyperthreaded Xeon CPU workstation with 8Gb RAM and 4Tb disk with an NVIDIA N280 GPU CUDA-accelerated graphics card, (v) a quad 8-core hyperthreaded Xeon CPU workstation with 128Gb RAM and 16Tb total disk, (vi) a 72Tb file server with 12Gb RAM, (vii) a 96Tb quad 6-core file server with 64Gb RAM, (viii) and several Linux workstations connected through a gigabit network.

Condensed Matter Facilities:

- Ultra-low temperature laboratory has a dilution refrigerator, 3He and 4He cryostats and microwave sources to study quantum phenomena in nano- and microscale devices, superconducting qubits, nanostructures and quantum fluids and solids.
- The Energy Materials Research Laboratory includes a Variable Temperature UHV Scanning Probe Microscope installed in an STC-50 rated acoustic chamber.
- The Magnetic material laboratory conducts research on amorphous magnetic thin films and fiber optical sensors.

- The Surface science laboratory has a scanning probe microscopy to study surface structure interfaces at the atomic level.

Particle Physics Facilities:

- The Detector Development Laboratory provides experimental support for an international research program in non-accelerator nuclear and particle physics, including measurements of neutrino properties, tests of conservation laws, and searches for rare interactions.

Laboratory for High-Performance Computational Physics:

- This computer lab has 15 powerful workstations-each with Intel Core i5 3570 running at 3.4 Ghz, 16 Gb RAM, and an nVidia GTX 650 graphics card. They are running Ubuntu 13.04 operating system. Each workstation has a 24 inch screen monitor. These world-class workstations are connected to our main file server via the highest quality gigabyte network connectors.

Physics Faculty

Alexey Aprelev, PhD *(St Petersburg State University)*. Assistant Teaching Professor. Experimental biophysics.

Shyamalendu Bose, PhD *(University of Maryland)*. Professor. Theory of surfaces and interfaces, disordered systems, electron and X-ray spectroscopy of solids, high-temperature superconductivity.

Luis R. Cruz Cruz, PhD *(MIT)*. Associate Professor. Correlation studies and density map analysis of the loss of spatial organization of neurons in the aged brain: computational studies of the folding of the Alzheimer amyloid beta protein using all-atom molecular dynamics:cellular automata models of the growth of plaques in Alzheimer's disease: fluid flow through porous media using computer lattice models.

N. John Dinardo, PhD *(University of Pennsylvania) Vice Provost for Academic Affairs*. Professor. Vibrational and electron dynamics at semiconductor surfaces and interfaces, metal-semiconductor interfaces, polymer surfaces and interfaces, diamond-like carbon thin films, and protein and cell interactions with biomaterials surfaces.

Michelle Dolinski, PhD *(University of California, Berkeley)*. Assistant Professor. Neutrino physics, rare nuclear decays, cyrogenic detector technologies.

Frank A. Ferrone, PhD *(Princeton University)*. Professor. Experimental and theoretical protein dynamics, kinetics of biological self-assembly, including sickle cell and Alzheimer's disease.

Robert Gilmore, PhD *(Massachusetts Institute of Technology)*. Professor. Applications of compact and non-compact Lie algebras for problems in nuclear, atomic, and molecular physics; nonlinear dynamics and chaos and the analysis of chaotic data.

David M. Goldberg, PhD *(Princeton University) Associate Dean for Research and Graduate Education, Associate Department Head for Undergraduate Studies*. Professor. Theoretical and computational cosmology, extragalactic astrophysics, parallel computing.

Maher Harb, PhD *(University of Toronto)*. Assistant Professor. Solid state physics; ultrafast Electron diffraction; time-resolved X-ray diffraction; nanofabrication; nano/microfluidics; instrument development; vacuum technologies.

Goran Karapetrov, PhD *(Oregon State University)*. Associate Professor. Experimental solid state physics, scanning probe microscopy, nanoscale catalysis, mesoscopic superconductivity.

Charles Lane, PhD *(California Institute of Technology)*. Professor. Experimental tests of invariance principles and conservation laws, experimental search for magnetic monopoles and high-energy cosmic neutrinos, solar neutrinos and neutrino oscillations.

Teck-Kah Lim, PhD *(University of Adelaide)*. Professor. Structures and dynamics of small nuclear and molecular systems, spin-polarized quantum systems, physics in two dimensions. Physics education.

Christina Love, PhD *(Temple University)*. Assistant Teaching Professor. Educational methods and technology, STEM education, science literacy and outreach, particle physics, astrophysics.

Stephen L. W. McMillan, PhD *(Harvard University) Department Head*. Professor. Stellar dynamics, large-scale computations of stellar systems, and high-performance special-purpose computers.

Naoko Kurahashi Neilson, PhD *(Stanford University)*. Assistant Professor. Neutrino physics, high energy astro-particle physics.

Russell Neilson, PhD *(Stanford University)*. Assistant Professor. Dark matter, neutrino physics.

Gordon Richards, PhD *(University of Chicago)*. Professor. Quasars, active galactic nuclei, supermassive black holes, sky surveys, gravitational lensing, galaxy evolution.

Richard I Steinberg, PhD *(Yale University)*. Professor. Experimental tests of invariance principles and conservation laws, experimental search for magnetic monopoles and high-energy cosmic neutrinos (MACRO experiment at Gran Sasso Laboratory, Italy), solar neutrinos and neutrino oscillations (CHOOZ project).

Somdev Tyagi, PhD *(Brigham Young University) Associate Head of Non-Major Studies in Physics*. Professor. Nanobiophysics, Raman spectroscopy, magnetic materials.

Brigita Urbanc, PhD *(University of Ljubljana, Slovenia)*. Associate Professor. Landau-Ginsburg theory of ferroelectric liquid crystals; cellular automaton model of Alzheimer's senile plaque growth; protein folding and assembly relevant to Alzheimer's and Parkinson's diseases; discrete (discontinuous) molecular dynamics simulations and coarse-grain protein models; applications of automated neuron recognition and density map methods to quantify spatial correlations in aging brain.

Michel Vallières, PhD *(University of Pennsylvania)*. Professor. Shell-model and mean field studies of nuclei on and off beta-stability, chaotic scattering, computational physics.

Michael Vogeley, PhD *(Harvard University) Associate Head of Graduate Studies in Physics*. Professor. Cosmology; galaxy formation and evolution; statistical analysis of large data sets; active galactic nuclei.

Jian-Min Yuan, PhD *(University of Chicago)*. Professor. Protein folding, signal transduction pathways, computational biophysics, nonlinear dynamics and chaos in atomic and molecular systems, protein folding.

Interdepartmental Faculty

Jonathan E. Spanier, PhD *(Columbia University) Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces;

scanning probe microscopy; laser spectroscopy, including Raman scattering.

Emeritus Faculty

Leonard D. Cohen, PhD *(University of Pennsylvania)*. Professor Emeritus.

Leonard X. Finegold, PhD *(University of London)*. Professor Emeritus. Biological physics and granular physics.

Richard D. Haracz, PhD *(Wayne State University)*. Professor Emeritus.

Frederick House, PhD *(University of Wisconsin)*. Professor Emeritus.

Arthur P. Joblin, PhD *(Drexel University)*. Professor Emeritus.

Donald C. Larson, PhD *(Harvard University)*. Professor Emeritus.

Arthur E. Lord, PhD *(Columbia University)*. Professor Emeritus.

James McCray, PhD *(California Institute of Technology)*. Professor Emeritus.

T. S. Venkataraman, PhD *(Worcester Polytechnic Institute)*. Professor Emeritus. Material engineering and physics.

Programs in Psychology and Clinical Psychology

Major: Psychology
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS) or 91.0 (PhD)
Classification of Instructional Programs (CIP) code: 42.0101
Standard Occupational Classification (SOC) code: 19-3031; 19-3032; 19-3039

About the Programs

The MS in Psychology program is designed for students interested in advanced education in scientific psychology in order to obtain further educational or career opportunities.

The PhD in Psychology with the specialization in Clinical Psychology program places equal emphasis on clinical research and the application of scientific principles.

The PhD in Psychology with a specialization in Applied Cognitive and Brain Science program is designed for students who wish to pursue a research based career in human experimental psychology with a concentration in applied cognitive and brain science.

For more information, visit the Department of Psychology (http://drexel.edu/coas/academics/departments-centers/psychology) website.

Master of Science in Psychology

The master of science degree in the Department of Psychology, College of Arts & Sciences, is ideal for students interested in pursuing graduate education in scientific psychology and research methods.

The program is an opportunity for students to take their first step into graduate education, and to begin a path toward further educational and career opportunities. These opportunities may include further graduate-level training leading to a PhD, a career in research, or other educational and administrative opportunities. The curriculum is focused on training

in a range of research experience in neurocognitive and behavioral sciences. In addition to required coursework, students are required to complete a minimum of eight hours per week with a research mentor in laboratory activities. These activities culminate with the successful completion of an empirical thesis.

Requirements for Admission

Applicants must meet the general University requirements for admission, including a minimum 3.0 GPA (on a 4.0 scale) for the last two years of undergraduate study. Applicants to the graduate program in psychology are also required to submit scores from the Graduate Record Examination (GRE) general tests. Only applications for full-time status are considered.

Various factors are considered in choosing students. These include background in psychology, undergraduate (and, if applicable, graduate) GPA, GRE scores, a personal essay, and letters of recommendation. The minimum expected combined GRE score is 302, with scores 150 on each section (verbal, quantitative) of the GRE.

For additional information on how to apply, visit Drexel's Admissions Requirements for Psychology (http://www.drexel.edu/grad/programs/coas/psychology) page.

Degree Requirements

The general requirements for earning the MS degree in psychology are as follows:

- Completion of all required coursework with a minimum grade point average of 3.0, with no grade lower than a B in any required (non-elective) course and no more than two course grades of C or lower.
- Successful completion of a minimum of 45.0 course credits. Students take required courses and select additional electives.
- Successful completion of required research laboratory hours (8 hours per week for 2 years).
- Completion of an empirical thesis.

For more information on specific requirements, consult the Master's of Science in Psychology (http://drexel.edu/coas/academics/graduate-programs/psychology) website.

PSY 510	Research Methods I	3.0
PSY 511	Research Methods II	3.0
PSY 512	Cognitive Psychology	3.0
PSY 610	Data Analysis in Psychology	3.0
PSY 624	Behavior Analysis	3.0
PSY 710	Data Analysis II	3.0
PSY 898	Master's Thesis in Psychology	3.0
PSY 898	Master's Thesis in Psychology	3.0
PSY 898	Master's Thesis in Psychology	3.0
Additional Electives		18.0
Total Credits		**45.0**

PhD in Psychology: Clinical Psychology

The Ph.D. Program in Clinical Psychology program is a scientist-practitioner-oriented program that is fully accredited by the American Psychological Association (APA). It encompasses five years of full-time study and provides graduate students with a strong foundation in relevant psychological theory, experience in the practice of psychological assessment and intervention, experience in conducting meaningful clinical

research, and opportunities to develop teaching competencies. See the Clinical Psychology Program's websit (http://drexel.edu/coas/academics/graduate-programs/psychology-clinical)e (http://www.drexel.edu/psychology/academics/graduate/clinical) for more information.

Requirements for Admission

All students are admitted with the expectation that they intend to complete the PhD degree. However, before advancing to doctoral-level studies, students must earn the MS, including completion of a master's thesis. Admitted students who hold a bachelor's degree are expected to complete both the master's degree and post-master's portions of the Drexel curriculum. Applicants who already hold a master's from another university may be admitted with post-master's status if their graduate-level preparation is deemed equivalent to the master's portion of the Drexel curriculum.

Requirements for Students Enrolling with a Bachelor's Degree
For those entering with a bachelor's degree, the PhD program requires approximately five years to complete. The first two years of training correspond to the master's-level studies: focusing on clinical areas such as entry-level assessment and intervention skills, psychopathology, and specialized study in Clinical Neuropsychology, Clinical Health psychology, Cognitive and Behavioral Psychology, Clinical Child Psychology and/or Forensic Psychology. These two years also include a major focus on research skills, involving statistics, research design, and supervised research experience with the mentor. Entry-level assessment, intervention, and teaching skills are also developed.

By the end of the first two years of study, students should have completed 45.0 credits of coursework, maintained a GPA of at least 3.5, developed and defended a thesis, passed comprehensive examinations and completed practicum experience, both internally (Psychological Service Center) and external clinical practicum experiences. Students demonstrating satisfactory performance in these areas will be admitted to post-master's status.

Requirements for Students Who Already Hold a Master's Degree
Students entering with a master's degree from another university complete the PhD requirements in 4-5 years. The master's degree should have included an experimental thesis. Students lacking this prerequisite will still be considered for admission, but such students will be required to complete a research project equivalent to the Drexel master's thesis. In addition, students must demonstrate a GPA of at least 3.5 in master's-level courses in order to be accepted for post-master's status.

For additional information on how to apply, visit Drexel's Admissions Requirements for Psychology (http://www.drexel.edu/grad/programs/coas/psychology-phd) page.

Curriculum

The program in Clinical Psychology curriculum follows the scientist-practitioner model and APA guidelines on accreditation of doctoral clinical psychology programs. It also considers state licensing guidelines and various publications that have been written on the topic of doctoral education, training, and credentialing in clinical psychology, as well as the specialty areas of Clinical Neuropsychology, Clinical Health Psychology, Cognitive and Behavioral Psychology, Clinical Child Psychology and/or Forensic Psychology.

The following section outlines the courses required for graduation for entering Bachelor's-level students. The PhD program curriculum requires the student to earn a minimum of 90.0 credits. Typically, students enroll

in 27.0 credits during the first year, 22.0 credits during the second and third years, 12.0 credits in the fourth year, and 8.0 credits during the fifth/final internship year. Drexel University operates on a calendar of four eleven-week terms. Students in the program do not take courses during summer term in order to complete research projects and continue clinical practicum training.

All coursework can be divided into two major components: (1) foundations of psychology, which is the evolving body of knowledge in the discipline of psychology, and (2) clinical and professional training, which focuses on the application of theory and empirical research to the practice of psychology. Listed below are all required and elective courses offered within the Drexel psychology curriculum followed by specific requirements for each major area of study. Credit levels listed are set at the minimum required.

Required Courses

Foundations of Psychology		
PSY 516	Developmental Psychology	3.0
PSY 712	History and Systems	3.0
Statistics/Research Methods		
PSY 510	Research Methods I	3.0
PSY 610	Data Analysis in Psychology	3.0
PSY 710	Data Analysis II	3.0
PSY 711	Data Analysis III: Advanced Topics	3.0
PSY 898	Master's Thesis in Psychology	3.0
PSY 998	Ph.D. Dissertation in Psychology	4.0
Biological Bases of Behavior		
PSY 630	Biological Basis of Behavior and Treatment	3.0
Select one of the following:		3.0
PSY 530	Neuroanatomy and Behavior	
PSY T880	Special Topics in Psychology	
Cognitive/Affective Bases of Behavior		
PSY 812	Cognitive Neuroscience	3.0
Select one of the following:		3.0
PSY 512	Cognitive Psychology	
PSY 614	Problem Solving & Creativity	
PSY 616	Motivation and Emotion	
Social Bases of Behavior		
PSY 518	Social Psychology	3.0
PSY 550	Multicultural Perspectives in Psychology	3.0
Clinical and Professional Training General Foundations of Practice		
PSY 520	Psychopathology	3.0
PSY 524	Professional Issues and Ethics	3.0
PSY 560	Teaching, Consultation and Supervision in Psychology [*]	3.0
Foundations of Psychological Evaluation/Measurement		
PSY 515	Clinical Case Conceptualization	3.0
PSY 522	Psychological and Intellectual Assessment	3.0
PSY 620	Personality Assessment	3.0
Foundations of Intervention		
PSY 721	Principles of Psychotherapy	3.0
PSY 722	Theories of Intervention	3.0
PSY 820	Cognitive-Behavioral Therapy	3.0

PSY 897	Clinical Psychology Practicum Seminar	3.0
PSY 899	Practicum	1.0
PSY 999	Internship	4.0
Advanced Professional Training Electives		
Select five of the following:		15.0
PSY 542	Neuropsychological Assessment	
PSY 642	Neuropsychological Case Analysis and Integration	
PSY 646	Neuropsychological Assessment of Children and Adolescents	
PSY 648	Forensic Assessment I	
PSY 649	Forensic Assessment II	
PSY 650	Child Psychopathology & Treatment	
PSY 720	Health Psychology	
PSY 730	Criminal Law and Psychology	
PSY 734	Social Science Applications to the Law	
PSY 811	Multilevel Regression	
PSY 815	Evidence-Based Psychotherapy	
PSY 822	Pediatric Psychology	
PSY 823	Substance Use	
PSY 827	Behavioral Stress Management	
PSY 828	Weight and Eating Disorders	
PSY 830	Advanced Topics in Health Psychology	
PSY 840	Advanced Cognitive-Behavioral Therapy	
PSY 854	Psychology of Rehabilitation	
PSY T880	Special Topics in Psychology	
Total Credits		**93.0**

*   Taken for 1 credit in Fall and 2 credits in Spring.

Major Areas of Study

Clinical Neuropsychology

The clinical neuropsychology concentration includes courses, research, and clinical experiences designed to train the students for professional practice in neuropsychology. Clinical neuropsychology involves the application of psychological assessment and intervention to the problems encountered by people with brain injury or illness. The knowledge of brain-behavior functioning and the incorporation of neuropsychological conceptualizations with traditional clinical conceptualizations of functioning are aimed at providing the student with a wider perspective regarding the range of human functioning and disability. The student is able to pursue specific interests in geriatrics, pediatrics, traumatic brain injury, and rehabilitation.

In addition to the core curriculum:

- One neuropsychology practicum
- A neuropsychology-focused thesis and dissertation
- Required classes: Neuroanatomy and Behavior, Neuropsychological Assessment, Neuropsychological Case Analysis and Integration
- At least two neuropsychology electives: Learning and Memory, Rehabilitation, Psychology, Principles of Neuroscience, Advanced Neuropsychological Assessment and Intervention: Children and Adolescents, Nuropsychologioy and Brain Imaging

Forensic Psychology

Forensic psychology involves the application of assessment and intervention techniques to informing legal decision-makers and attorneys on questions in criminal, civil, and family law. Those who concentrate in forensic psychology will be trained in relevant law, behavioral science research, and assessment and intervention approaches with a particular focus on juvenile and criminal issues.

In addition to the core curriculum:

- One forensic psychology practicum
- A forensic psychology-focused thesis and dissertation
- At least two years of research in an area related to forensic psychology
- Required classes: Forensic Assessment I and II, Mental Health Law
- At least two forensic psychology electives.

Clinical Health Psychology

Health psychology adopts a broad-based, biopsychosocial perspective in order to: (1) better understand the interplay among behavioral, emotional, cognitive, social, and biological factors regarding health, wellness, and physical disease; (2) promote and maintain wellness and positive physical health; (3) prevent, treat, and rehabilitate illness and disability, and (4) improve the health care delivery system. The health psychology concentration aims to provide specialty training in order to prepare graduate students for academic and/or clinical positions where the primary focus is on physical health problems.

In addition to the core curriculum:

- One health psychology practicum
- A health psychology-focused thesis and dissertation
- Required classes: Health Psychology, Evidence-Based Assessment and Psychotherapy, Behavioral Stress Management
- At least three Health Psychology electives

Cognitive and Behavioral Psychology

Cognitive behavior therapy (CBT) represents a broad family of psychological interventions that are grounded in scientific theories and principles derived from psychology and related disciplines, and that stress the empirical validation of intervention methods. Various theories, principles, models, and techniques fall under the general rubric of CBT, and these approaches have been applied to the full range of human experience, from the assessment and treatment of severe psychopathology and profound developmental delays to primary prevention efforts to enhancing peak performance among athletes.

Common features of the various CBT approaches include a focus primarily on the present rather than the past, an emphasis on parsimony in theoretical explanations, grounding in learning principles (including principles related to how we interpret the world and/or how we related to our own experience), and the emphasis on epistemological empiricism. The aim of this major area of study is to provide pre-specialty training in order to prepare graduate students for academic and/or clinical positions in which CBT is a primary focus.

Additional requirements beyond the core curriculum include:

- One Cognitive and Behavioral Psychology-oriented practicum
- A Cognitive and Behavioral Psychology--focused thesis and/or dissertation
- Required classes: Advanced Cognitive Behavioral Therapy, Evidence Based Assessment and Treatment, Acceptance Based Behavioral Therapy
- At least two Cognitive and Behavioral Psychology electives

Clinical Child Psychology

The clinical child psychology major area of study is designed for students who have strong clinical and/or research interests in working with children and adolescents. Students in this major area of study will complete the required courses taken by all clinical psychology students and will also enroll in child-related elective courses designed to help them develop a greater degree of expertise in working with child and adolescent populations. It is expected that students completing this specialization will develop an appreciation of the research literature in the clinical child area and will possess specialty skills that enable them to function as competent practitioners in the child/adolescent area upon graduation.

Additional requirements beyond the core curriculum include:

- One Clinical Child Psychology oriented practicum
- A Clinical Child Psychology focused thesis and/or dissertation
- Required classes: Child Psychopathology, Pediatric Psychology, Neuropsychological Evaluation and Intervention of Children and Adolescents
- At least two Clinical Child Psychology electives

For more information on the PhD program requirements,contact the Clinical Psychology PhD Program (http://drexel.edu/coas/academics/graduate-programs/psychology-clinical/contact).

PhD in Psychology: Applied Cognitive and Brain Science (ACBS)

The Department of Psychology's program in Applied Cognitive and Brain Sciences (ACBS) program is a research-oriented, non-clinical program in experimental psychology and/or cognitive neuroscience. The program places equal emphasis on basic research and the application of scientific principles. Please visit the ACBS website (http://drexel.edu/coas/academics/graduate-programs/psychology-applied-cognitive-brain-science) for more information.

Admissions

Drexel University is seeking applicants with a strong academic record, as evidenced by their GRE scores (a quantitative plus verbal sum of 1250 or greater is desirable), strength of undergraduate institution and GPA (3.5 or greater is preferred). In addition, applicants should have outstanding letters of recommendation (from doctoral-level academic, research oriented psychologists, if possible), high-quality research experience, and include a statement of purpose that convinces Drexel that a potential student is an excellent "match" for one or more of our research groups.

For more details on how to apply to this program, please visit the Graduate Admissions Psychology (http://www.drexel.edu/grad/programs/coas/psychology-phd-applied-cognitive-and-brain-sciences) page.

Curriculum

The PhD program curriculum requires student to earn a minimum of 90.0 credits. Students completing the concentration in Applied Cognitive and Brain Science take all or most of their core courses within the first two years. The third and fourth years, following the receipt of the master's degree, successful passing of the qualifying examinations, and advancement to doctoral candidacy, will be spent in enrichment or specialization courses negotiated with their research supervisor and in research activities.

The following section outlines the courses required for graduation for entering Bachelor's-level student

First Year

Fall		Credits
PSY 512	Cognitive Psychology	3.0
PSY 610	Data Analysis in Psychology	3.0
PSY 812	Cognitive Neuroscience	3.0
PSY 560	Teaching, Consultation and Supervision in Psychology	1.0
	Term Credits	**10.0**
Winter		
PSY 710	Data Analysis II	3.0
PSY 611	Computer-Based Research Methods for Psychological Research	3.0
PSY 530	Neuroanatomy and Behavior (or other elective)	3.0
	Term Credits	**9.0**
Spring		
PSY 711	Data Analysis III: Advanced Topics	3.0
PSY 614	Problem Solving Creativity (or other elective)	3.0
PSY 562	Consciousness (or other elective)	3.0
	Term Credits	**9.0**
Second Year		
Fall		
PSY 811	Multilevel Regression	3.0
PSY 632	Sensory and Motor Systems (or other elective)	3.0
	Term Credits	**6.0**
Winter		
PSY 532	Introduction to Cognitive Modeling	3.0
PSY 865	Course PSY 865 Not Found	3.0
	Term Credits	**6.0**
Spring		
PSY 898	Master's Thesis in Psychology	3.0
PSY 712	History and Systems (or other elective)	3.0
	Term Credits	**6.0**

Total Credit: 46.0

Sample Electives

PSY 510	Research Methods I
PSY 511	Research Methods II
PSY 516	Developmental Psychology
PSY 517	Social Cognition
PSY 562	Consciousness
PSY 610	Data Analysis in Psychology
PSY 612	Psychology of Human-Computer Interaction Design
PSY 616	Motivation and Emotion
PSY 617	Empirical Unconscious Process
PSY 621	Theories of Personality
PSY 630	Biological Basis of Behavior and Treatment
PSY 632	Sensory and Motor Systems
PSY 648	Forensic Assessment I
PSY 649	Forensic Assessment II

PSY 710	Data Analysis II	
PSY 711	Data Analysis III: Advanced Topics	
PSY 712	History and Systems	
PSY 720	Health Psychology	
PSY 730	Criminal Law and Psychology	
PSY 746	Neuropsychological Evaluation and Intervention of Children and Adolescents	
PSY 812	Cognitive Neuroscience	
PSY 840	Advanced Cognitive-Behavioral Therapy	
PSY 865	Course PSY 865 Not Found	
PSY 898	Master's Thesis in Psychology	
PSY 998	Ph.D. Dissertation in Psychology	

Enrichment Courses from other Disciplines

Computer Science

CS 510	Introduction to Artificial Intelligence	3.0
CS 530	Developing User Interfaces	3.0
CS 610	Advanced Artificial Intelligence	3.0

Information Systems

INFO 608	Human-Computer Interaction	3.0
INFO 610	Analysis of Interactive Systems	3.0
INFO 611	Design of Interactive Systems	3.0

Biomedical Engineering and Sciences

BMES 531	Chronobioengineering I	3.0
BMES 532	Chronobioengineering II	3.0
BMES 551	Biomedical Signal Processing	3.0
BMES 710	Neural Signals	3.0

For more information on the PhD program requirements, consult Department of Psychology's (http://psychology.drexel.edu) web site.

Facilities

Computers
Computer resources for student use include more than 20 personal computers (IBM, Macintosh) available in the library and 10 IBM PCs available in the computer laboratory. Both facilities are near the department. In both locations, word processing and biostatistics software is available.

By using computers from their homes or in the library, students have free access to e-mail and a wide array of online services (e.g., the Internet, World Wide Web, and literature databases such as PsychLit and Medline).

Library
Psychology books and journals are located at the Center City Hahnemann Campus library, Moore Campus Library on Henry Avenue, Queen Lane Library on the Queen Lane Campus, and the W. W. Hagerty Library on the University City Campus. The combined holdings represent one of the best psychology libraries on the East Coast.

Equipment
Testing equipment for classroom instruction is available to psychology graduate students. The program also has videotape and audiotape equipment available for classroom instruction and research activities.

Psychology Faculty

Meg Butryn, PhD *(Drexel University)*. Assistant Research Professor. Treatment and prevention of obesity and eating disorders, behavioral treatment, acceptance and commitment therapy.

Dorothy Charbonnier, PhD *(SUNY Stony Brook)*. Assistant Teaching Professor. The nature of the creative process and writing.

Douglas L. Chute, PhD *(University of Missouri) Louis and Bessie Stein Fellow*. Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Brian Daly, PhD *(Loyola University, Chicago)*. Assistant Professor. Pediatric neuropsychology, intervention with at-risk youth.

David DeMatteo, PhD, JD *(MCP Hahnemann University; Villanova University School of Law) Director of the JD-PhD Program in Law and Psychology*. Associate Professor. Psychopathy, forensic mental health assessment, drug policy; offender diversion.

Evan M. Forman, PhD *(University of Rochester) Director of Graduate Studies*. Associate Professor. Clinical psychology: mechanisms and measurement of psychotherapy outcome, cognitive-behavioral and acceptance based psychotherapies, the development and evaluation of acceptance-based interventions for health behavior change (for problems of obesity and cardiac disease) as well as mood and anxiety disorders; neurocognition of eating.

Jennifer Gallo, PhD *(Drexel University)*. Associate Teaching Professor. Geropsychology, neuropsychology, and assessment of dementia.

Pamela Geller, PhD *(Kent State University)*. Associate Professor. Stressful life events and physical and mental health outcomes, particularly in the area of women's reproductive health (e.g. pregnancy, pregnancy loss, infertility, medical education).

Maureen Gibney, PsyD *(Widener University)*. Associate Teaching Professor. Clinical psychopathology; neuropsychological evaluation and intervention with the elderly.

Naomi Goldstein, PhD *(University of Massachusetts) Co-Director of the JD-PhD Program*. Associate Professor. Forensic psychology; juvenile justice; Miranda rights comprehension; false confessions; juvenile justice treatment outcome research; anger management intervention development; child and adolescent behavior problems.

Kirk Heilbrun, PhD *(University of Texas at Austin)*. Professor. Forensic psychology, violence risk communication, juvenile and adult criminality, violence risk assessment, forensic psychological assessment, treatment of mentally disordered offenders, academic-sports mentoring.

James D. Herbert, PhD *(University of North Carolina) Department Head, Psychology*. Professor. Assessment and treatment of anxiety disorders; acceptance and mindfulness-based psychotherapies; the role of empiricism in clinical psychology; evidence-based practice in behavioral health.

Marlin Killen, PhD *(Trident University International) Faculty Coordinator of ePsychology*. Associate Teaching Professor.

Jacqueline D. Kloss, PhD *(Binghamton University)*. Associate Professor. Health psychology; clinical psychology; written emotional expression

and health; women and sleep; college students and sleep and cognitive-behavioral approaches to insomnia.

John Kounios, PhD *(University of Michigan) Director, PhD Program in Applied Cognitive and Brain Sciences*. Professor. Cognitive neuroscience, especially creativity, problem solving, and cognitive enhancement.

Michael Lowe, PhD *(Boston College)*. Professor. Prevention and treatment of eating disorders and obesity; effects of appetitive responsiveness and dietary restraint on eating regulation; psychobiology of obesity-proneness; empirical foundations of unconscious processes.

Tamara Medina, PhD *(Johns Hopkins University)*. Assistant Teaching Professor. Developmental psychology, cognitive psychology, statistics.

Dan Mirman, PhD *(Carnegie Mellon University)*. Assistant Professor. Recognition, comprehension, and production of spoken words; organization and processing of semantic knowledge; computational models of brain and behavior; statistical methods for analysis of time course data

Arthur Nezu, PhD *(State University of New York at Stony Brook)*. Distinguished Professor. Behavioral medicine applications of problem-solving therapy and other cognitive-behavior therapies (e.g., to decrease emotional and psychosocial risk factors; improve adherence), particularly with regard to patients with cardiovascular disease; assessment.

Christine Maguth Nezu, PhD *(Fairleigh Dickinson University)*. Professor. Cognitive-behavioral assessment and treatment for mood, anxiety, personality disorders, and coping with chronic illness; mind/body studies; stress and coping; developmental disabilities and comorbid behavioral and emotional disorders; spirituality and psychology.

Karol Osipowicz, PhD *(Thomas Jefferson University)*. Assistant Teaching Professor. The application of advanced neuroimaging to the study of human brain function and anatomy.

Ludo Scheffer, PhD *(University of Pennsylvania) Director of Undergraduate Studies*. Teaching Professor. Metacognition; early literacy and language acquisition; program evaluation and measurement to improve student achievement and teacher performance.

Maria Schultheis, PhD *(Drexel University) Director of Clinical Training*. Associate Professor. Clinical Neuropsychology and rehabilitation following neurological compromise (brain injury, stroke, multiple sclerosis), application of technologies in psychology. Specialization in the use of virtual reality (VR) simulation, and evaluation of the demands of driving after disability.

Jennifer Schwartz, PhD *(Idaho State University) Director of Psychological Services Center*. Associate Teaching Professor. Adult psychopathology; evidence-based clinical practice; competency-based training; competency-based clinical supervision.

Chris Sims, PhD *(Rensselaer Polytechnic Institute)*. Assistant Professor. Learning and decision-making under uncertainty; visual memory and perceptual expertise; sensorimotor control and motor learning; computational models of cognition.

Julia Sluzenski, PhD *(Temple University)*. Assistant Teaching Professor. Spatial and episodic memory, memory loss across the lifespan, developmental psychology.

Mary Spiers, PhD *(University of Alabama at Birmingham) Director, Psychology Master's Program*. Associate Professor. Clinical

neuropsychology and medical psychology; memory and practical applications for memory disorders in the elderly; cognitive health of women.

J. Michael Williams, PhD *(University of Vermont)*. Associate Professor. Memory disorder; traumatic brain injury; auditory neglect; neuropsychological assessment; recovery and rehabilitation of brain function; functional magnetic resonance imaging.

Eric A Zillmer, PsyD *(Florida Institute of Technology) Carl R. Pacifico Professor of Neuropsychology and the Director of Athletics*. Professor. Psychological assessment (neuropsychological, cognitive, personality), psychiatric and neurological disorders, behavioral medicine, neurogerontology, mathematical modeling, sports psychology, psychology of genocide.

Interdepartmental Faculty

Charles A. Williams, PhD *(Temple University)*. Associate Teaching Professor. Prevention of school-aged violence.

Emeritus Faculty

Thomas T. Hewett, PhD *(University of Illinois at Urbana-Champaign)*. Professor Emeritus. Human computer interaction and cognitive engineering; development of computing environments to support knowledge, workers, and high performance experts.

Myrna Shure, PhD *(Cornell University)*. Professor Emeritus. Child development, problem-solving interventions with children, prevention programs.

The College of Engineering

About the College

The College of Engineering prepares a new generation of engineers dedicated to discovery and the application of technology to promote economic development and improve quality of life.

Drexel University's College of Engineering is guided by five core values that shape the curriculum and experience for all students: excellence in academics and research; personal, intellectual and professional development; diversity; innovation and exploration; internal and external collaborations and partnerships. We provide a research agenda for our PhD students that addresses society's most pressing challenges regionally, nationally and globally. Our Master of Science students are trained in strategic leadership and entrepreneurial risk-taking to address the opportunities and challenges of a rapidly changing industry.

The graduate programs at Drexel College of Engineering integrate evolving engineering science with the growing fields of engineering applications and processes. As Drexel moves though the 21st century, the College of Engineering will continue to offer students a diverse academic learning and research environment, while continuing to build on its national reputation for excellence in engineering and research.

Majors

Certificates

*   Multidisciplinary program, offered in concert with other Drexel University Colleges.

About Graduate Co-op

Drexel University's long tradition in the field of experiential learning has now been extended into many of its master's programs in science, business, and engineering.

This option, called the Graduate Co-op Program (http://www.drexel.edu/scdc/co-op/graduate) (GCP), provides students with the opportunity to gain work experience directly related to their career goals while earning academic credit. Students who have earned a minimum of 24 credits with a GPA of at least 3.0 are eligible to participate. Employment typically lasts six months, during which students enroll in a special 3 credit GCP course coinciding with their term of employment. Students gain work experience while earning salaries. It is important to note that the GCP program does not guarantee a job. It is a market-driven process for the candidates as well as employers. GCP provides the tools and contacts; the student must qualify for the job on the basis of merit, qualifications, and skills.

Further information on the GCP program is available at the Drexel Steinbright Career Development Center. (http://www.drexel.edu/scdc)

Architectural Engineering

About the Program

Architectural Engineering is inherently an interdisciplinary enterprise that is centered on the design, construction, and operation of the built environment. Architectural Engineering MS or PhD graduates may include students with expertise in one or more of the following sub-disciplines (usually housed in civil/environmental engineering and elsewhere in traditional disciplinary constructs or newly developing fields of focus or expertise):

1. Building energy efficiency and alternative energy
2. Indoor environmental quality

Our graduates are engineers and researchers trained in integrated building design and operation practices, who can work on interdisciplinary teams that are able to develop creative solutions combined with technological advances to produce functional, efficient, attractive and sustainable building infrastructure.

Admission Requirements

Applicants to the MS or PhD in Architectural Engineering must meet the following requirements:

- A BS in Engineering OR
- For students without an Engineering degree, the following courses, or their approved equivalents from other departments, will meet these requirements:
    - Fundamental Fluids – CIVE 320
    - Thermodynamics – ENGR 210
    - Heat Transfer – MEM 345 – for Building Energy students

- Basic Chemistry – CHEM 102 – for Indoor Environmental Quality students

The application package will include:

- undergraduate and graduate transcripts;
- three letters of recommendation from faculty or professionals who can evaluate the applicant's promise as a graduate student;
- GRE scores;
- a written statement of career and educational goals.

Competitive applicants will possess an undergraduate GPA of 3.30 or higher and GRE scores above the 60th percentile.

MS in Architectural Engineering

Major: Architectural Engineering
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 14.0401
Standard Occupational Classification (SOC) code: 11-9041

Degree Requirements

The goal of the MS in Architectural Engineering (AE) is to produce graduates who have a solid understanding of the Architectural Engineering discipline as well as an understanding of the interrelationships between the major AE sub-disciplines. Graduates will have demonstrated the ability and capacity to apply that understanding and skill, and the curriculum and project requirements are designed to provide to the students and then ask them to demonstrate the ability to effectively engage in professional-level performance.

Required Courses

Core Courses for all AE students		
AE 510	Intelligent Buildings	3.0
AE 550	Comfort Analysis and Indoor Air Quality	3.0
AE 544	Building Envelope Systems	3.0
AE 551	Building Energy Systems I	3.0
MEM 591	Applied Engr Analy Methods I	3.0
MEM 592	Applied Engr Analy Methods II	3.0
Building Energy Theme		
Complete three of the following:		9.0
AE 552	Building Energy Systems II	
CHE 513	Chemical Engineering Thermodynamics	
CHE 525	Transport Phenomena I	
MEM 611	Conduction Heat Transfer	
MEM 612	Convection Heat Transfer	
MEM 621	Foundations of Fluid Mechanics	
Indoor Air Quality (IAQ) Theme		
Complete three of the following:		9.0
AE 790	Course AE 790 Not Found [*]	
CHE 525	Transport Phenomena I	
ENVE 560	Fundamentals of Air Pollution Control	
ENVE 660	Chemical Kinetics in Environmental Engineering	
ENVS 501	Chemistry of the Environment	
MEM 621	Foundations of Fluid Mechanics	

Additional Electives [**]	9.0
Total Credits	**45.0**

[*] Indoor Modeling and Field Measurements.

[**] The balance of the required 45.0 credits, a maximum of 18.0 credits, will be electives approved by the student's advisor and the departmental graduate advisor.

PhD in Architectural Engineering

Major: Architectural Engineering
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 90.0
Classification of Instructional Programs (CIP) code: 14.0401
Standard Occupational Classification (SOC) code: 11-9041

Degree Requirements

The following general requirements must be satisfied in order to complete the PhD in Architectural Engineering:

- 90.0 quarter credit hours total (or 45 credit hours post-MS)
- Plan of study established with Advisor
- Qualifying courses
- Candidacy exam
- Approval of dissertation proposal
- Defense of dissertation
- Full-time residency for one continuous academic year is usually desired for the PhD degree to ensure students the opportunity for intellectual association with other scholars.

Students entering with a master's degree may be exempted from some or all of the courses in the breadth requirement; however, they are still required to meet all milestones of the program. Individual courses may also be transferred with approval of the Graduate Advisor. The total credit amount, candidacy exam, and dissertation are University Requirements. Additional requirements are determined by the department offering the degree.

MSAE coursework plus research and courses defined by the dissertation Committee	90.0

Qualifying Courses

To satisfy the qualifying requirements, students must earn a grade of B+ or better in the first 6 Architectural Engineering graduate courses taken at Drexel, and must earn an overall GPA of 3.5 or better in these courses. Normally these courses comprise at least 4 "core" courses and either 2 more courses, either "core" or in one of the Architectural Engineering themes taken as part of the PhD program; however, they may in some cases include more advanced courses (e.g., if the student has received transfer credit for a core course).

Undergraduate courses, independent studies, research credits, and courses from other departments cannot be counted toward the qualifying requirements. Student progress toward these requirements will be assessed in the Annual Review following the student's first year in the PhD program. For more information visit the Department's PhD Program Requirements page.

Candidacy Exam

After approximately one year of study beyond the master's degree, doctoral students take a candidacy examination, consisting of written and oral parts. The Architectural Engineering candidacy examination serves to define the student's research domain and to evaluate the student's knowledge and understanding of various fundamental and seminal results in that domain. At this point the student is expected to be able to read, understand, analyze, and explain advanced technical results in a specialized area of Architectural Engineering at an adequate level of detail. The candidacy examination will evaluate those abilities using a defined set of published manuscripts. The student will prepare a written summary of the contents of the material, present the summary orally, and answer questions about the material. The examination committee will evaluate the written summary, the oral presentation, and the student's answers.

Thesis Proposal

After completing the candidacy examination successfully, the PhD candidate must prepare a thesis proposal that outlines, in detail, the specific problems that will be solved in the PhD dissertation. The quality of the research proposal should be at the level of, for example, a peer-reviewed proposal to a federal funding agency, or a publishable scientific paper. The candidate is responsible for sending the research proposal to the PhD committee two weeks before the oral presentation. The PhD committee need not be the same as the candidacy exam committee, but it follows the same requirements and must be approved by the Office of Graduate Studies. The oral presentation involves a 30-40-minute presentation by the candidate followed by an unspecified period during which the committee will ask questions.

After the question and answer period, the candidate will be asked to leave the room and the committee will determine if the research proposal has been accepted. The research proposal can be repeated at most once. A thesis proposal must be approved within two years of becoming a PhD candidate.

After approval of the proposal, the committee meets from time to time to review the progress of the research.

Thesis Defense

After completing the research proposal successfully, the PhD candidate must conduct the necessary research and publish the results in a PhD dissertation. The dissertation must be submitted to the PhD committee two weeks prior to the oral defense and at least 90 days before the graduation date. The oral presentation involves a 45-minute presentation by the candidate, open to the public, followed by an unspecified period during which the committee will ask questions. The question and answer period is not open to the public.

After the question and answer period, the candidate will be asked to leave the room and the committee will determine if the candidate has passed or failed the examination. The candidate will be granted one more chance to pass the final defense if he or she fails it the first time. Paperwork selecting the thesis committee and indicating the results of the thesis defense must be filed with the Department of Civil, Architectural and Environmental Engineering and the Office of Graduate Studies.

The PhD degree is awarded for original research on a significant Architectural Engineering problem. Graduate students who have an MS degree or have completed work equivalent to that required for of an MS degree will continue to work closely with individual faculty members to purse the PhD degree (see Faculty Research Interests on the department website). PhD dissertation research is usually supported by a research grant from a government agency or an industrial contract.

Many doctoral students take three to five years of full-time graduate study to complete their degrees.

Indoor Air Quality - Sample Plan of Study

First Year

Term 1		Credits
AE 544	Building Envelope Systems	3.0
AE 550	Comfort Analysis and Indoor Air Quality	3.0
MEM 591	Applied Engr Analy Methods I	3.0
	Term Credits	**9.0**
Term 2		
AE 510	Intelligent Buildings	3.0
AE 551	Building Energy Systems I	3.0
MEM 592	Applied Engr Analy Methods II	3.0
	Term Credits	**9.0**
Term 3		
AE 790	Course AE 790 Not Found	3.0
Free Elective		3.0
Free Elective		3.0
	Term Credits	**9.0**

Second Year

Term 1		
Free Elective		3.0
ENVS 501	Chemistry of the Environment	3.0
MEM 621	Foundations of Fluid Mechanics	3.0
	Term Credits	**9.0**
Term 2		
CHE 525	Transport Phenomena I	3.0
ENVE 560	Fundamentals of Air Pollution Control	3.0
ENVE 660	Chemical Kinetics in Environmental Engineering	3.0
	Term Credits	**9.0**

Total Credit: 45.0

Undergraduate Course Prerequisites for students without an Engineering Degree:

The following courses, or their approved equivalents from other departments, will meet these requirements:

- CIVE 320 - Fundamental Fluids
- CHEM 102 - Basic Chemistry
- ENGR 210 - Thermodynamics

Building Energy - Sample Plan of Study

First Year

Term 1		Credits
AE 550	Comfort Analysis and Indoor Air Quality	3.0
MEM 591	Applied Engr Analy Methods I	3.0

MEM 611	Conduction Heat Transfer	3.0
	Term Credits	**9.0**
Term 2		
AE 510	Intelligent Buildings	3.0
MEM 592	Applied Engr Analy Methods II	3.0
MEM 612	Convection Heat Transfer	3.0
	Term Credits	**9.0**
Term 3		
AE 551	Building Energy Systems I	3.0
Free Elective		3.0
Free Elective		3.0
	Term Credits	**9.0**
Second Year		
Term 1		
AE 544	Building Envelope Systems	3.0
CHE 513	Chemical Engineering Thermodynamics	3.0
MEM 621	Foundations of Fluid Mechanics	3.0
	Term Credits	**9.0**
Term 2		
CHE 525	Transport Phenomena I	3.0
ENVE 727	Risk Assessment	3.0
AE 552	Building Energy Systems II	3.0
	Term Credits	**9.0**

Total Credit: 45.0

Undergraduate Course Prerequisites for students without an Engineering Degree

The following courses, or their approved equivalents from other departments, will meet these requirements:

- CIVE 320 - Fundamental Fluids
- MEM 345 - Heat Transfer
- ENGR 210 - Thermodynamics

PhD in Architectural Engineering

Upon entering the PhD program, each student will be assigned an academic advisor, and with the help of the advisor will develop and file a plan of study (which can be brought up to date when necessary). The plan of study should be filed with the Graduate Coordinator no later than the end of the first term.

Certificate in Construction Management

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.2001
Standard Occupational Classification (SOC) Code: 11-9021

The certificate in construction management has been designed for professionals to develop the multidisciplinary skills required of effective construction managers.

Students have the option of completing this 18.0 credit certificate in construction management as a stand-alone professional development credential, or as a step toward the MS in Construction Management program (http://drexel.edu/engmgmt/cmgt/academics/ms).

The admissions process for this program is the same as for the MS in Construction Management (http://www.drexel.edu/grad/apply/overview).

Requirements

CMGT 510	Construction Control Techniques	3.0
CMGT 512	Cost Estimating and Bidding Strategies	3.0
CMGT 515	Risk Management in Construction	3.0
CMGT 525	Applied Construction Project Management	3.0
CMGT 528	Construction Contract Administration	3.0
CMGT 538	Strategic Management in Construction	3.0
Total Credits		**18.0**

Certificate in Infrastructure Engineering Management

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree in engineering
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Maximum Time Frame: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 15.1501
Standard Occupational Classification (SOC) Code: 17-3026

Note: Effective Fall 2014, students are no longer being accepted into this certificate program.

The graduate certificate in infrastructure engineering management is designed to prepare engineers to manage large-scale infrastructure projects and key personal interactions with external stakeholders. The program builds upon the College of Engineering's excellence in areas such as engineering management, civil engineering, and environmental risk analysis. Courses focus on decision making, planning and management and explore the impact of regulations on work with public funding and how contractual relationships dominate its execution.

Upon successful completion of the program, graduates will be skilled at managing the flow of public resources, integrating an array of projects into a long-term program, and incorporating public values and participation in infrastructure decisions.The six-course sequence is an 18-credit graduate certificate students can utilize either as a professional development credential or to apply as electives toward the completion of a Master's in Engineering Management.

Required Courses

EGMT 501	Engineering Management	3.0
EGMT 515	Infrastructure Systems & Performance Evaluation	3.0
EGMT 516	Infrastructure Project & Program Planning	3.0

EGMT 517	Public Value & Participation in Infrastructure Decision	3.0
EGMT 520	Infrastructure Capstone	3.0
Elective chosen from either the MS in Engineering Management or MS in Construction Management programs		3.0
Total Credits		**18.0**

Certificate in Power Engineering Management

Certificate Level: Graduate
Admissions Requirements: Undergraduate degree in engineering
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 15.1501
Standard Occupational Classification (SOC) Code: 17-3026

The certificate in power engineering management is oriented toward engineers in power utilities, utility associations, or infrastructure firms interested in power distribution systems. The scope of this graduate-level program includes both program management and enhancement of technical knowledge beyond a bachelor's degree.

Admission to this graduate certificate program requires an undergraduate degree in engineering. Completed credits from the certificate completion can apply toward either a master's in engineering management or a master's in electrical engineering.

Required Courses

ECEP 501	Power System Analysis	3.0
ECEP 502	Computer Analysis of Power Systems	3.0
ECEP 503	Synchronous Machine Modeling	3.0
ECEP 612	Economic Operation of Power Systems	3.0
EGMT 501	Engineering Management	3.0
EGMT 516	Infrastructure Project & Program Planning	3.0
Total Credits		**18.0**

Graduate Certificate in Project Management

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1–2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.0211
Standard Occupational Classification (SOC) Code: 11-9199

While project management has been around since the 1950s, the field has experienced an explosion of growth, both in the number of project managers being employed and in the expectations of the industry. Not only is work becoming more "projectized," but also more organizations are using project management to achieve business results. This requires a solid foundation in business fundamentals, communication, and leadership, as well as skills in program management and portfolio management.

The graduate certificate in Project Management is designed to support the growing need for project management graduate education. It provides students with the knowledge and skills necessary for successful professional and leadership careers in the rapidly-expanding field of project management and will prepare students to pursue the Certified Associate in Project Management (CAPM)® or Project Management Professional (PMP)® credential from the Project Management Institute (PMI)®.

Program Requirements

Required Courses

PROJ 501	Introduction to Project Management	3.0
PROJ 502	Project Planning & Scheduling	3.0
PROJ 510	Project Quality Management	3.0
PROJ 515	Project Estimation & Cost Management	3.0
PROJ 603	Project Leadership & Teamwork	3.0
Elective courses		3.0
Select 1 of the following:		
PROJ 520	Project Risk Assessment & Management	
PROJ 530	Managing Multiple Projects	
PROJ 535	International Project Management	
PROJ 540	Project Procurement Management	
Project Management Elective (5XX or higher)		
Total Credits		**18.0**

Admission Requirements

- **Bachelor's degree** from a regionally accredited institution with a cumulative Grade Point Average (GPA) of 3.0) or higher; graduate degree GPAs will be considered along with the undergraduate GPA. Applicants with a cumulative GPA below 3.0 may be considered.

- **Official transcripts** from all universities or colleges and other post-secondary educational institutions, including trade schools, attended. Instead of hard copy transcripts, you may email official electronic transcripts issued by a post-secondary institution directly to Drexel University Online. All transcripts must be supplied, regardless of the number of credits earned or the type of school attended. If all post-secondary institutions are not listed on the application, and then listed on transcripts received from other institutions, application processing will be delayed until the remaining transcripts are submitted. Use Drexel's Transcript Lookup Tool to assist you in contacting your previous institutions.

- **Two letters of recommendation**, professional or academic. Drexel University Online now accepts electronic letters of recommendation. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.

- **Personal essay** of between 500–750 words describing your interest in the program. Specifically discuss the following:
  - How the program relates to your current line of work
  - How you plan to apply the program to your future goals

- How the program relates to your previous educational activities
- If changing course, why are you moving in a new direction
- **Resume**
- International students must submit a TOEFL score of 550 or higher. For more information regarding international applicant requirements, view the International Students Admissions Information page.
- An interview may be required.

Certificate in Real Estate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Campus, Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.1501
Standard Occupational Classification (SOC) Code: 11-9141

This graduate certificate seeks to produce professionals with the knowledge, skills, and perspective required to be successful in the real estate development process and the industry as a whole. Students explore the knowledge and skills required to create, maintain, and build environments for living, working and entertainment purposes.

Relevant issues include project finance, real estate as investments, design and construction, operations, development law, environmental remediation, public policy, market analysis, and architecture.

Students wising to complete this certificate in the context of a master's degree should consider the MS in Construction Management (http://www.drexel.edu/catalog/grad/goodwin/ms0cmgt-) with a concentration in Real Estate.

Requirements

REAL 568	Real Estate Development	3.0
REAL 571	Advanced Real Estate Investment & Analysis	3.0
REAL 572	Advanced Market Research & Analysis	3.0
REAL 575	Real Estate Finance	3.0
REAL 577	Legal Issues in Real Estate Development	3.0
Select one of the following:		3.0
REAL 573	Sales & Marketing of Real Estate	
REAL 574	Real Estate Economics in Urban Markets	
REAL 576	Real Estate Valuation & Analysis	
Total Credits		**18.0**

Certificate in Sustainability and Green Construction

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 52.2001
Standard Occupational Classification (SOC) Code: 11-9021

The architectural, engineering, and construction community faces the daunting task of providing a built environment which is in harmony with the natural environment—meeting the current needs of society without jeopardizing the ability of future generations to meet their needs. Sustainable development means integrating the decision-making process across the project team, so that every decision is made with an eye to the greatest long-term benefits.

The certificate in Sustainability and Green Construction is a flexible, part-time post-baccalaureate program, focused on the sustainable aspects of the construction process. Students have the opportunity to complete all requirements within one and a half years.

Currently, in the Leadership in Energy and Environmental Design (LEED) green building rating system, the construction process represents a significant portion of the effort required to achieve high performance building programs. This certificate program is intended to explore these concepts in detail. Credits from this certificate will transfer toward a Master of Science in Construction Management.

Requirements

CMGT 501	Leadership in Construction	3.0
CMGT 512	Cost Estimating and Bidding Strategies	3.0
CMGT 515	Risk Management in Construction	3.0
CMGT 535	Community Impact Analysis	3.0
CMGT 538	Strategic Management in Construction	3.0
CMGT 545	Sustainable Principles & Practices	3.0
CMGT 546	Sustainable Technologies	3.0
CMGT 547	LEED Concepts	3.0
CMGT 558	Community Sustainability	3.0
Total Credits		**27.0**

Chemical Engineering

Major: Chemical Engineering
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.0701
Standard Occupational Classification (SOC) code: 17-2041

About the Program

The graduate program in the Chemical and Biological Engineering Department integrates current chemical engineering science with the growing fields of engineering applications and processes, emphasizing engineering design and scientific analysis. The department intends to develop broadly educated individuals who are knowledgeable in modern theories, cognizant of the behavior of engineering systems, and aware of current mathematical and engineering tools that are useful for the solution of problems in complex processes and systems, especially those in the fields of chemical, environmental, biochemical, and materials process engineering. Areas of particular strength include biological engineering, energy and the environment, multiscale modeling and process systems engineering, and polymer science and engineering.

Programs are arranged to meet the needs and interests of individual students. The plan of study is initially formulated in consultation with the

departmental graduate advisor and subsequently guided by the thesis advisor.

Graduates have pursued a variety of careers, ranging from faculty positions in academia to research and development in industry, in the U.S. and overseas.

Additional Information

For more information about this program, visit Drexel University's Department of Chemical and Biological Engineering (http://drexel.edu/cbe) web page.

Admission Requirements

Students should fulfill Drexel University's general requirements for admission to graduate studies. The subjects normally included in an undergraduate program in chemical engineering provide a satisfactory background. Decisions regarding prerequisite qualifications for students who may be deficient in some areas are made after consultation with the departmental graduate advisor.

The core courses are designed for students with undergraduate training in chemical engineering. However, students with a background in biological sciences and engineering can also enroll in the core courses after completing the necessary basic engineering courses and disciplinary chemical engineering courses. Programs for such students are determined on an individual basis after consultation with the departmental graduate advisor.

Graduate study in chemical engineering is offered on a regular full-time basis and on a part-time basis. Details not covered in the following information may be obtained by contacting the departmental graduate advisor. The General (Aptitude) Test of the Graduate Record Examination (GRE) is required for applicants pursuing full-time study.

Financial Assistance

Financial aid in the form of teaching assistantships, research assistantships, and fellowship grants is available to qualified full-time PhD students. Awards are made annually on a competitive basis.

For additional information on how to apply, visit Drexel's Admissions page for Chemical Engineering (http://www.drexel.edu/grad/programs/coe/chemical-engineering).

Master of Science in Chemical Engineering

Degree Requirements

In general, each program leading to the Master of Science in Chemical Engineering must meet the following requirements: core chemical engineering, 15.0 credits; area of concentration, at least 15.0 credits; electives, at most 6.0 credits; research, at most 15.0 credits. Core courses in the chemical engineering Master's program are listed below. A Master's Thesis is optional.

Thesis option: The thesis may be based on either a theoretical or an experimental investigation, or both, of limited scope but involving a significant degree of originality. The nature of the research may involve multidisciplinary areas such as biological engineering, materials processing and engineering, energy and the environment, and other topics. The scope and content of the thesis is guided by the thesis advisor. All students pursuing a Master's with Thesis must complete

9.0 credits of thesis research (CHE 898) and, at the discretion of the research advisor, up to 6.0 credits of independent study (CHE I799). Credits not devoted to independent study may be applied to general (non-concentration) graduate-level electives or to additional credits of thesis research.

Coursework-only (non-Thesis) option: Students not pursuing Master's with Thesis may take up to 9.0 credits of independent study (CHE I799) and 6.0 credits of general graduate-level electives. Independent study is **not** required for a non-thesis Master's. Non-thesis students may also take additional concentration electives beyond the required 15.0-credit series. Non-thesis students may **not** register for thesis research.

Concentration: All Master's students must complete a 15-credit series of concentration electives. Concentration electives may be chosen from course offerings in chemical engineering, mathematics, science, and other engineering disciplines, and are subject to approval by the departmental graduate advisor. Sample concentration series courses are listed below; there are many other possibilities. Non-concentration electives need only be graduate-level.

Full-time students usually take the core courses in the first year. Other courses may be substituted for the core courses, if equivalent courses are available and if the substitution is approved by the graduate advisor. Full-time students normally require a minimum of one calendar year to complete their study and research. Some courses are offered in the late afternoon or evening for the convenience of part-time students. The current schedule of evening courses for part-time students are available upon request.

Curriculum

CHE 502	Mathematical Methods in Chemical Engineering	3.0
CHE 513	Chemical Engineering Thermodynamics	3.0
CHE 525	Transport Phenomena I	3.0
CHE 543	Kinetics & Catalysis I	3.0
CHE 554	Process Systems Engineering	3.0
Area of Concentration		15.0
Thesis/Research		9.0
Electives		6.0
Sample Areas of Concentration		
Biochemical Engineering		
Sample Courses		
BIO 500	Biochemistry I	
BIO 610	Biochemistry of Metabolism	
BMES 501	Medical Sciences I	
CHE 562	Bioreactor Engineering	
CHE 564	Unit Operations in Bioprocess Systems	
Computer Science		
Sample Courses		
CS 543	Operating Systems	
CS 551	Compiler Construction I	
CS 552	Compiler Construction II	
CS 550	Programming Languages	
Engineering Management		
Sample Courses		
EGMT 501	Engineering Management	
EGMT 502	Advanced Engineering Management	
EGMT 504	Engineering Management Communications	

| EGMT 531 | Engineering Economic Evaluation & Analysis | |
| EGMT 581 | Human Relations and Organizational Behavior | |

Environmental Engineering

Sample Courses

ENVS 501	Chemistry of the Environment	
ENVS 608	Fate of Pollutants in Air and Water	
ENVE 661	Env Engr Op-Chem & Phys	
ENVE 662	Enviro Engr Unit Oper-Bio	
ENVE 865	Course ENVE 865 Not Found	

Materials Science and Engineering

Sample Courses

MATE 500	Structure and Properties of Metals	
MATE 501	Structure and Properties of Polymers	
MATE 502	Structure and Properties of Ceramic and Electronic Materials	
MATE 505	Phase Equilibria	
MATE 507	Kinetics	
Total Credits		**45.0**

PhD in Chemical Engineering

Superior students with MS or BS degrees will be considered for the doctoral program in chemical engineering. Students joining with a Master's degree may satisfy up to 45.0 credit hours of the PhD course/research credit requirements depending on the courses taken and/or research carried out in their Master's programs, subject to approval by graduate program advisor.

Requirements

The following general requirements must be satisfied in order to complete the PhD in chemical engineering:

- 90 credit hours total
- Qualifying exam (first year)
- Establishing a plan of study (first term)
- 18 core credits
- 15 credit hours of specialized plan of study
- 57 credit hours of research
- Candidacy exam (5th term)
- Dissertation/Thesis
- Defense of Dissertation/Thesis
- GPA requirements: 3.0 overall; 3.0 in graduate Chemical Engineering (CHE) courses; 3.0 core graduate courses

Qualifying Exam

The qualifying exam takes place in the first year. The department administers the exam twice a year – in January and June. The objective of the exam is to evaluate proficiency in core undergraduate chemical engineering material. The format is made up of seven problems, each covering a separate core topic from the undergraduate curriculum, including thermodynamics, heat transfer, mass transfer, fluid mechanics, kinetics, control, and separations. Students must display mastery of five out of the seven topics to pass the qualifying exam. Each student will be given two opportunities to pass the qualifying exam.

Thesis Advisor/Plan of Study

All students must meet with their advisor in their first term to work out a plan of study.

Core Requirements

CHE 502	Mathematical Methods in Chemical Engineering	3.0
CHE 513	Chemical Engineering Thermodynamics	3.0
CHE 525	Transport Phenomena I	3.0
CHE 543	Kinetics & Catalysis I	3.0
CHE 614	Chemical Engineering Thermodynamics II	3.0
CHE 626	Transport Phenomena II	3.0
Specialized Plan of Study Courses		**15.0**

15.0 credit hours of courses approved by research advisor. All students are expected to develop competence in their area(s) of specialization.

| **Research** | | **57.0** |

57.0 credit hours of research (CHE 998), which may include up to 6.0 credit hours of electives.

| CHE 998 | Ph.D. Dissertation | |
| **Total Credits** | | **90.0** |

Candidacy Exam

The components of the candidacy exam are as follows::

- Proposal Document (Written): The student is required to write a research proposal of about 15 pages, including background, preliminary results, and a research plan (with his/her advisor's input). The proposal must be submitted to each member of the student's thesis committee and to the Graduate Program Advisor **before 5:00 pm on the first day of the student's 5th term.**
- Proposal Defense (Oral): The student provides a formal defense of his/her proposal to his/her thesis committee **before the end of the student's 5th term.**

Thesis/Dissertation and Defense

As the culmination of intensive study and independent research, the doctoral dissertation represents a major scholarly endeavor; accordingly, it is recognized as the most important requirement of the degree. All doctoral candidates must present an acceptable dissertation based on significant work. The dissertation must represent a unique contribution to chemical engineering or biochemical engineering knowledge. A final oral examination is conducted, in part, as a defense of the dissertation.

A preliminary exam is targeted for the student's 12th term, with this scheduling subject to the research advisor's discretion. This preliminary exam is to ensure that the student has made adequate progress in his/her project and that he/she has gained skills to write an independent research proposal.

The requirements of the thesis/dissertation and defense include:

- Proposal Document, a.k.a. "Second Proposal": The student is required to write a research proposal of about 15 pages, including background, summary of results to date, and a plan for completion of the thesis work (with minimal advisor input). The proposal must be submitted to each member of the student's thesis committee well in advance of the oral exam date.

- Preliminary Defense (Oral Examination): The student must defend the second proposal and the thesis work to-date in an oral examination by his/her thesis committee.
- Manuscript Submission: Before taking the preliminary exam, the student is required to submit at least one paper based on his/her PhD research to a refereed journal. This must be an original article, not a review.
- A copy of the written proposal, together with a copy of the submitted paper with acknowledgment of submission from the journal editor, must be submitted to the Graduate Program Advisor before the Preliminary Defense and at least 6 months before the Thesis Defense.
- The student is responsible for scheduling the Preliminary Defense
- Students should submit a copy of the Preliminary Exam Reporting Form (http://drexel.edu/cbe/resources/forms) no later than three days after the exam.

For more information, visit the Chemical and Biological Engineering Department (http://drexel.edu/cbe) web page.

Facilities

Abrams Laboratory (ABRAMS)

Cat-472 (Server room) and Cat-361 (Student offices)

- High-performance computer clusters
  - lamneth -- 90-core DDR Infiniband
  - narpet -- 40-core DDR Infiniband
- Workstation computers (panacea, maelstrom, cygnus, redstar, syrinx, presto)
- 24TB RAID server (nlgn)

Access to:

- The University Research Computing Facility (URCF)
- The Draco Cluster (Dept. Physics)
- TeraGrid/XSEDE Allocation (TACC Stampede)

Nanomaterials for Energy Applications and Technology Laboratory (BAXTER)

Cat-266

- Amplified Ti:Sapphire laser with time-resolved teraherterz spectroscopy and femtosecond UV/vis/NIR transient absorption spectroscopy (Bossone 106)
- Solar simulator with monochromator and photovoltaic/photoelectrochemical test station
- Electrochemical impedance spectroscopy
- Layer-by-layer deposition robot
- Dip coater
- Spin coater
- Electrodeposition station
- Continuous flow microreactors

Biofuels Laboratory (CAIRNCROSS)

Cat-265

- Bubble column biodiesel reactors
- Recirculating heated oil baths
- Quartz crystal microbalance / heat conduction calorimeter (Masscal G1)
- Maxtek quartz crystal microbalance with phase lock oscillator
- Parr reactor

Elabd Laboratory (ELABD)

Cat-262, 263, 264

- Electrochemical Impedance Spectrometer (EIS) (Solartron: 1260 impedance analyzer, 1287 electrochemical interface, Zplot software) with many custom made 4 and 2 electrode cells
- Fuel Cell Test Station (Scribner 850C with fuel cell software) equipped for gas and liquid fuels and PEM and AEM test cells
- FTIR spectrometer (Nicolet Nexus 6700) equipped with multiple multi-bounce ATR flow-through cell attachments (Specac)
- FTIR spectrometer (Nicolet Nexus 6700)
- Golden GateTM diamond single-bounce ATR attachment (Specac)
- Silver GateTM zinc selenide single-bounce ATR attachment (Specac)
- Silver GateTM germanium single-bounce ATR attachment retrofit for electrochemical measurements (Specac)
- Dynamic Vapor Sorption (DVS) (TA Instruments Q5000 SA)
- Dynamic Vapor Sorption (DVS) with Cahn balance (Surface Measurement Systems)
- Differential Scanning Calorimeter (DSC) (TA Instruments Q200) with cooling accessory with temperature range of -180 to 725°C
- Gel Permeation Chromatography (GPC) (Waters Breeze 2) with 1525 Binary HPLC Pump for two separate columns (columns for THF and DMF), 214 Refractive Index Detector
- Environmental Chamber (Tenney) with high temperature/humidity control ranging from 25-200°C and 5-95%RH and integrated with vapor permeation and EIS
- Electrospinning Apparatus with custom-built enclosed chamber, 2 syringe pumps, and high voltage power supply (Glassman High Voltage, Inc. Series EL)
- Multipycnometer (Quantachrome)
- Two Liquid Diffusion Cells (PermeGear) integrated to flow-through ATR cell for detection with temperature control
- Vapor Sorption Apparatus (custom-built) with pressure transducer, temperature-controlled chamber, and quartz springs for the measurement of vapor and vapor mixture diffusion and sorption in polymers. This equipment is also integrated to an FTIR-ATR spectrometer for the measurement of molecular transport of pure vapors and vapor mixtures in polymers
- Gas Permeation and Sorption Apparatus (custom-built) with pressure and sorption cells, pressure transducer, and temperature-controlled chamber for the measurement of gas permeation and sorption in polymers
- Mass Spectrometer (MS) (HP 5989B), Gas Chromatograph (GC) (HP 5890), Liquid Chromatograph (LC) (HP 1090)
- Gravimetric Balances (Precisa XR 125 SM-FR, 10 µg accuracy; Mettler Toledo AB 54-S, 100 µg accuracy; Mettler Toledo B2002-S, 10 mg accuracy)

- Sonicators (QSONICA Q125, Cole-Parmer 8890)
- Heat Press (Carver 3351-0)
- Charged-Coupled Device (CCD) camera (Cognex in-sight 5403 vision sensor with patmax)
- Tube Furnace (Barnstead/Thermolyne 21100)
- Convection Oven
- Three Vacuum Ovens
- Three Vacuum Pumps
- 2x Water Bath (Thermo Scientific Neslab RTE 10)
- Rotary Evaporator (Buchi Rotovapor®)
- Many stir/hot plates and other wet chemistry accessories

Nanofibers for Energy Storage and Conversion Laboratory (KALRA)

Cat-471

- Four Electrospinning Staions (with core-shell spinning capability)
- Tube Furnaces/Convection Ovens/Vacumm Ovens
- Mbraun Dual User Glove Box
- Carver Heat Press
- Gamry Ref 3000 Potentiostat
- 32-channel Maccor Battery Cycler

Access to:

- Drexel's Centralized Research Facilties (SEM, TEM, Ultramicrotome, FTIR, XPS, XRD, Multi-angle x-ray scattering)
- XSEDE Compute Hours Allocation
- Synchrotron at Brookhaven National Lab
- BET Surface are and Porosity Analyzer

Thin Film and Devices Laboratory (LAU)

CAT-382

- Chemical Vapor Deposition Thin Film Reactor System I
- Chemical Vapor Deposition Rotating Bed Reactor System
- Gamry Reference 600 Electrochemical Testing Station
- Solar Illuminator
- Nicolet 6700 FTIR Spectrometer
- Laurell Technologies Spin Coater

Bossone-521

- Chemical Vapor Deposition Thin Film Reactor System II

Access to:

- Centralized Research Facilities (SEM, TEM, XRD, SAXS, XPS, Raman, Profilometer)
- Thermogravimetric Analyzer
- Differential Scanning Calorimeter
- Dynamic Mechanical Analyzer
- UV-Vis Spectrophotometer

Biosensor and Bioanalytics Laboratory (MUTHARASAN)

Cat-466, 469

- Custom-built bio-analytical flow apparatus for conducting in situ surface chemistry and detection assays of pathogens, biomarkers, DNA and RNA
- Impedance Analyzers Agilent 4294A and Agilent HP4192A with bridge circuits for device characterization
- Electrochemical Impedance Spectrometer, Gamry Interface 1000 with three electrode cells, and interfaces to biosensor flow cell; Ag/AgCl and Pt electrodes
- Stanford Research System QCM200 and flow cells
- Signal Recovery 875 Lock-In amplifier (plus computer-interface)
- Function/Arbitrary Waveform Generator, 80 MHz Agilent 33250A
- Agilent precision Giga-ohmmeter
- Bausch & Lomb optical Microscopes interfaced with image acquisition system
- Olympus OM-10 Fluorescence Microscope, coupled to Canon digital imaging and video systems
- PTI SS Fluorescence Spectrometer with PMT 750 detector
- UV-VIS spectrometer – Shimadzu UV-1800
- Denton Desktop high vacuum sputtering system; 6-inch target, one or two cathode configuration, Base vacuum 10^{-6}
- Harrick RF Plasma Reactor (Model PDC-001, 200 W) modified for conducting plasma-assisted surface reactions
- UVP UV Radiation Oven, Model OG-1. Radiation at 185 and 254 nm
- 1550 nm DFB laser (Anritsu GB5A016) and 1310 nm DFB laser (QPhotonics), and associated power supplies
- High speed micro-centrifuge (200 – 15000 rpm)
- Vacuum ovens
- Incubators, 9 ft^3, 20-70°C
- Spectrum analyzer (ANDO AQ-6310B), LabView interface
- Ericsson FSU 975 fusion splicer
- Laminar Flow Hoods, Precision CO_2 Incubators, Spinners, bioreactors (0.1L to 1L)

Access to:

- Bruker Daltonics Autoflex III Smartbeam TOF-MALDI mass spectrometer
- 8 M#, Milli-Q system
- Autoclave
- Hot room 37°C, 100 ft^2
- Refrigerated room 4°C, 100 ft^2

Polymers and Composites Laboratory (PALMESE)

Bossone-521

- TA Instruments TGA Q50 Thermogravimetric Analyzer
- KSV Instruments CAM 200 Contact Angle and Surface Tension Meter
- TA Instruments DSC Q2000 Differential Scanning Calorimeter
- Instron 8872
- Thermo Nicolet Nexus 870 FTIR

- TA Instruments DMA Dynamic Mechanical Analysis
- Perkin Elmer DSC7 Differential Scanning Calorimeter
- Waters GPC/HPLC (RI, UV Detectors)
- Electrospinning station
- TA Instruments AR Rheometer
- Thinky planetary centrifugal mixer ARE-250
- Melt Press
- Portable Near Infrared Spectrometer
- Brookfield digital viscometer
- Glove Box
- Supercritical Dryer (2x)
- Dielectric Barrier Discharge (DBD) plasma reactor

Process Systems Engineering Laboratory (SOROUSH)

- Interacting liquid level tanks
- 2-liter RC1 Calorimeter

Wrenn Laboratory (WRENN)

Cat-470

- PTI, Inc. C-71 Time-Resolved Fluorescence Spectrometer (pulsed nitrogen and dye lasers)
- PTI, Inc. A-710 Steady State Fluorescence Spectrometer
- Brookhaven 90Plus Dynamic Light Scattering Apparatus
- Brookhaven Goniometer-based, Static Light Scattering Apparatus
- Perkin-Elmer BUV40XW0 UV-Visible Absorbance Spectrometer
- Zeiss Axioskop2 Fluorescence microscope
- Zeiss Ultraviolet Digital Image Analysis System (contains Orca Camera, Sony 17" monitor, and Axiovision II software)
- Beckman Coulter Allegra64 Centrifuge
- Misonix, Inc. XL2020 Sonicator
- Lipex Biomembranes, Inc. Lipid Extruder (10 mL)

Chemical and Biological Engineering Faculty

Cameron F. Abrams, PhD *(University of California, Berkeley)*. Professor. Molecular simulations in biophysics and materials; receptors for insulin and growth factors; and HIV-1 envelope structure and function.

Jason Baxter, PhD *(University of California, Santa Barbara)*. Associate Professor. Solar cells, semiconductor nanomaterials, ultrafast spectroscopy.

Richard A. Cairncross, PhD *(University of Minnesota)*. Associate Professor. Effects of microstructure on transport and properties of polymers; moisture transport and degradation on biodegradation on biodegradable polymers; production of biofuel.

Nily R. Dan, PhD *(University of Minnesota)*. Associate Professor. Design of synthetic gene and drug carriers; design of polymeric drug carriers; metal cluster formation in polymeric matrices; colloidal absorption in patterned surfaces.

Yossef A. Elabd, PhD *(Johns Hopkins University)*. Professor. Fuel cells; polymer membranes; diffusion in polymers.

Vibha Kalra, PhD *(Cornell University)*. Assistant Professor. Nanotechnology, polymer nanocomposites.

Kenneth K.S. Lau, PhD *(Massachusetts Institute of Technology)*. Associate Professor. Surface science; nanotechnology; polymer thin films and coatings; chemical vapor deposition.

Raj Mutharasan, PhD *(Drexel University) Frank A, Fletcher Professor*. Biochemical engineering; cellular metabolism in bioreactors; biosensors.

Giuseppe R. Palmese, PhD *(University of Delaware) Department Head, Chemical and Biological Engineering*. Professor. Reacting polymer systems; nanostructured polymers; radiation processing of materials; composites and interfaces.

George F. Rowell, PhD *(University of Pennsylvania)*. Associate Teaching Professor. Undergraduate laboratory supervising.

Masoud Soroush, PhD *(University of Michigan)*. Professor. Process systems engineering; polymer engineering.

John H. Speidel, BSHE, MCHE *(University of Delaware; Illinois Institute of Technology)*. Teaching Professor.

Stephen P. Wrenn, PhD *(University of Delaware) Assistant Dean of Graduate Affairs, College of Engineering*. Associate Professor. Biomedical engineering; biological colloids; membrane phase behavior and cholesterol transport.

Emeritus Faculty

Charles B. Weinberger, PhD *(University of Michigan)*. Professor Emeritus. Suspension rheology; fluid mechanics of multi-phase systems.

Civil Engineering

Major: Civil Engineering
Degree Awarded: Master of Science in Civil Engineering (MSCE) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MSCE); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.0801
Standard Occupational Classification (SOC) code: 17-2015

About the Program

Objectives

The graduate program in civil engineering offers students the opportunity to develop a more fundamental and complete understanding of the principles that govern their field as well as current design methodology. Students are encouraged to be innovative and imaginative in their quest for recognizing, stating, analyzing, and solving engineering problems.

The goal of the master's program is to develop technical depth of expertise for a professional career in the planning, design, construction, and operation of large-scale infrastructure systems, built facilities, and water resources management. The goal of the PhD program is to develop the abilities to discover, pursue, and apply basic knowledge. PhD recipients are prepared to engage in teaching and research or in an industrial career in the development of new concepts and innovative systems.

General Information

The civil engineering programs comprise the following areas of specialization: building systems, geotechnical engineering, hydraulic and coastal engineering, structural engineering, and water resources.

For more information, visit the Department of Civil, Architectural and Environmental Engineering (http://www.cae.drexel.edu) web page.

Admission Requirements

MS admission is based on an academic record demonstrating adequate preparation and potential for successful graduate study. This typically includes a BS from an engineering curriculum accredited by the Accrediting Board for Engineering and Technology (ABET) or the equivalent from a non-U.S. institution. Submission of results from the Graduate Record Exam (GRE) is required. A grade point average (GPA) of 3.0 is usually required. Graduates who do not have a bachelor's degree in either Civil, Architectural or Environmental Engineering may be required to take preparatory undergraduate courses.

For additional information on how to apply, visit Drexel's Admissions page for Civil Engineering (http://www.drexel.edu/grad/programs/coe/civil-engineering).

Master of Science in Civil Engineering

The programs of study at the master's level continue the specialization developed at the senior level of the undergraduate program or newly developed interests. The Master of Science in Civil Engineering program may be elected by graduates of ABET-accredited undergraduate programs in civil engineering and related fields. Admission and prerequisites are determined on the basis of a student's undergraduate transcript.

Most MSCE graduates work as professional engineers in consulting firms, industry, or governmental agencies. A number of our graduates have started consulting and construction firms in the Philadelphia area and have been very successful. Other former students hold prominent positions in public utilities, local government agencies, and industry.

The full-time graduate academic program is closely associated with the research efforts of the faculty. Full-time master's degree candidates are encouraged to base their master's thesis on some aspect of faculty research. The one-to-one relationship between student and faculty member provides an invaluable learning experience. The General (Aptitude) Test of the Graduate Record Examination (GRE) is required for applicants pursuing full-time study.

The master's degree requires a total of 45.0 credits, of which 24.0 credits must be in the major field of interest and 6.0 credits are to fulfill math requirements. The remaining credits are taken as electives in related areas. The choice of core and elective courses is made in consultation with the student's graduate advisor.

Areas of concentration include:

- Structural
- Geotechnical/geoenvironmental/geosynthetics
- Water resources
- Building systems/energy

Dual graduate degrees are possible. Among the more popular programs are combining the MS in Civil Engineering with an MS in Environmental

Engineering, or Engineering Management. The required credits must meet all civil engineering program requirements and will be determined on the basis of the student's proposed program of study.

PhD in Civil Engineering

The PhD degree is awarded for original research on a significant civil engineering problem. Graduate students who have completed their MS degrees work closely with individual faculty members (see Faculty Research Interests below). PhD dissertation research is usually supported by a research grant from a government agency or an industrial contract.

The full-time graduate academic program is closely associated with the research efforts of the faculty. The General (Aptitude) Test of the Graduate Record Examination (GRE) is required for applicants pursing full-time study.

Doctoral students normally take at least 45.0 credits, including research credits, beyond the master's degree requirements. Full-time residency for one continuous academic year is required for the PhD degree to ensure students the opportunity for intellectual association with other scholars. Many doctoral students take two, three, or four years of full-time graduate study to complete their degrees. Involvement in the teaching activity of the Civil, Architectural and Environmental Engineering Department is required of all PhD applicants.

After approximately one year of study beyond the master's degree, doctoral students take a candidacy examination, consisting of written and oral parts. Each PhD candidate is supervised by a major professor and a doctoral committee chaired by the major professor.

PhD candidates submit a detailed proposal for dissertation research to the doctoral committee. The students then take a proposal examination; successful completion of this examination is required to become a PhD candidate. After approval of the proposal, the committee meets from time to time to review the progress of the research. The dissertation must be submitted to the doctoral committee at least 90 days before the graduation date. The committee schedules and conducts a final oral examination before approval of the dissertation.

Areas of research include:

- Structural
- Geotechnical/geoenvironmental/geosynthetics
- Water resources
- Sustainable engineering
- Building systems/energy

Dual Degree Programs

Civil Engineering students may find it useful to pursue dual MS degrees. Such programs have been pursued in concert with Environmental Engineering/Science, Mechanical Engineering, Information Studies and Engineering Management. A dual degree student must complete the required coursework for each degree. Depending upon the concentration, up to 15.0 credits from another program may count as electives for the MSCE. with the advisor's approval. The student is responsible for obtaining approval of MSCE. courses that apply to the second degree.

Bachelor's/Master's Dual Degree Program

Exceptional undergraduate students can also pursue a master of science degree in the same period as the bachelor of science. Many students deepen their knowledge with a Master's degree in Civil Engineering,

while others have broadened their knowledge with a Master's degree in related areas such as Environmental Science, Engineering Management, Software Engineering and Information Technology.

For more information about this program, visit the Department's BS/MS Dual Degree Program (http://www.drexel.edu/cae/academics/bs-environmental-engineering/Accelerated%20and%20Dual%20Degree%20Programs%20CAEE) web page.

Facilities

Construction Materials Laboratory
This laboratory contains facilities for the study of concrete, asphalt, mortar, soil-cement, and timber materials, and moist cure facilities.

Geosynthetics Laboratory
This laboratory contains a complete suite of physical, mechanical, hydraulic, endurance, and environmental test devices for assessing behavior of geotextiles, geogrids, geonets, geomembranes, and geocomposites.

HVAC and Refrigeration Laboratory
This laboratory contains complete models of heating, ventilation, air conditioning, refrigeration, and pumping system models.

Hydromechanics Laboratory
This laboratory contains a wave channel tilting flume, pipe friction equipment, bench demonstration equipment, and a beach erosion model.

Soil Mechanics and Geoenvironmental Laboratory
This laboratory contains triaxial and direct shear equipment, controlled environmental chambers, consolidation tests, flexwall permeameters, and a test bed.

Structural Testing Laboratory
This laboratory contains universal testing machines with 150,000- and 300,000-pound capacity and test beds with MTS dynamic load equipment.

Civil, Architectural and Environmental Engineering Faculty

Emin A. Aktan, PhD *(University of Illinois at Urbana-Champaign) John Roebling Professor of Infrastructure Studies.* Professor. Structural engineering; infrastructure; evaluation; intelligent systems.

Ivan Bartoli, PhD *(University of California, San Diego).* Assistant Professor. Non-destructive evaluation and structural health monitoring; dynamic identification, stress wave propagation modeling.

Robert Brehm, PhD *(Drexel University).* Associate Teaching Professor. International infrastructure delivery; response to natural catastrophes; risk assessment and mitigation strategies; project management techniques.

S.C. Jonathan Cheng, PhD *(West Virginia University).* Associate Professor. Soil mechanics; geosynthetics; probabilistic design; landfill containments.

Louis DaSaro, MS *(University of Delaware).* Associate Teaching Professor. Failure analysis and restoration of existing structures, blast resistant structures, green structures, engineering education.

Patricia Gallagher, PhD *(Virginia Polytechnic Institute).* Associate Professor. Soil mechanics; geoenvironmental; ground improvement; sustainability.

Patrick Gurian, PhD *(Carnegie-Mellon University).* Associate Professor. Risk analysis of environmental and infrastructure systems, novel adsorbent materials, environmental standard setting, Bayesian statistical modeling, community outreach and environmental health.

Charles N. Haas, PhD *(University of Illinois-Urbana) L. D. Betz Professor and Department Head, Civil, Architectural and Environmental Engineering.* Professor. Control of human exposures to and risk assessment of pathogenic organisms; water and waste treatment; homeland security.

Ahmad Hamid, PhD *(McMaster University).* Professor. Engineered masonry; building; cladding; prestressed concrete.

Y. Grace Hsuan, PhD *(Imperial College).* Professor. Polymeric and cementitioius materials; geosynthetic reliability and durability.

Joseph B. Hughes, PhD *(University of Iowa) Dean of the College of Engineering and Distinguished Professor.* Biological processes and applications of nanotechnology in environmental systems.

Joseph P. Martin, PhD *(Colorado State University).* Professor. Geoenvironmental engineering; urban environmental hydrology; transportation.

James E. Mitchell, MArch *(University of Pennsylvania).* Associate Professor. Architectural engineering design; building systems.

Franco Montalto, PhD *(Cornell University).* Associate Professor. Effects of built infrastructure on societal water needs, ecohydrologic patterns and processes, ecological restoration, green design, water interventions.

Franklin Moon, PhD *(Georgia Institute of Technology).* Associate Professor. Full-scale structural testing, structural dynamics, evaluation and rehabilitation of existing structures.

Joseph V. Mullin, PhD *(Pennsylvania State University).* Senior Lecturer. Structural material behavior, engineering economy and design.

Mira S. Olson, PhD *(University of Virginia).* Associate Professor. Groundwater; environmental fluid mechanics; hydrology.

Anu Pradhan, PhD *(Carnegie Mellon University).* Assistant Professor. Infrastructure management, construction engineering, transportation engineering, sensing system, geographic information system, statistical machine learning.

Yared Shifferaw, PhD *(Johns Hopkins University).* Assistant Professor. Computational and experimental mechanics, structural stability, optimization, health monitoring and hazard mitigation, sustainable structures, emerging materials, thin-walled structures and metallic structures.

Kurt Sjoblom, PhD *(Massachusetts Institute of Technology).* Assistant Professor. Laboratory testing of geomaterials, geotechnical engineering, foundation engineering.

Sabrina Spatari, PhD *(University of Toronto).* Assistant Professor. Research in industrial ecology; development and application of life cycle assessment (LCA) and material flow analysis (MFA) methods for guiding engineering and policy decisions; specific interest in biomass and bioenergy, biofuels, and urban infrastructure.

Michael Waring, PhD *(University of Texas-Austin).* Assistant Professor. Indoor air quality and building sustainability; indoor particulate matter fate

and transport; indoor chemistry and particle formation; secondary impacts of control technologies and strategies.

Jin Wen, PhD *(University of Iowa)*. Associate Professor. Architectural engineering, building control systems, indoor air quality.

Aspasia Zerva, PhD *(University of Illinois)*. Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Interdepartmental Faculty

Eugenia Ellis, PhD *(Virginia Polytechnic State University)*. Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Bakhtier Farouk, PhD *(University of Delaware) Billings Professor of Mechanical Engineering*. Professor. Heat transfer; combustion; numerical methods; turbulence modeling; materials processing.

Emeritus Faculty

Harry G. Harris, PhD *(Cornell University)*. Professor Emeritus. Structural models, dynamics of structures, plates and shells, industrialized building construction.

Robert M. Koerner, PhD *(Duke University)*. Harry Bownam Professor Emeritus. Geosynthetic engineering; soil mechanics; water resources.

Richard Weggel, PhD *(University of Illinois) Samuel S. Baxter Professor Emeritus; Civil and Environmental Engineering.* Professor Emeritus. Coastal engineering; hydraulics engineering; hydrology.

Richard Woodring, PhD *(University of Illinois) Dean of Engineering Emeritus*. Professor Emeritus. Structural engineering, reinforced concrete.

Communication

Major: Communication
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS)
Classification of Instructional Programs (CIP) code: 09.9999
Standard Occupational Classification (SOC) code: 11-2011; 11-2031; 25-1122

About the Program

The MS in Communication program, with a hands-on approach, prepares students for careers in technical communication, science communication, and public communication. A scholarly track in communication, culture and media is also offered.

Drexel's Master of Science in Communication program prepares students for careers in a wide range of professional activities. The program specializes in four areas:

- public communication
- communication, culture, and media
- technical communication
- science communication

Technical communication is for those seeking employment as technical writers, computer documentation specialists, and training specialists. Science communication has much to offer those who aspire to medical, science, and pharmaceutical writing. A concentration

in public communication leads to careers in journalism and public relations. In addition, the program provides a strong foundation in theoretical approaches to communication. This theoretical basis is designed to ensure that, as the field changes, students will continue to have an intellectual framework for evaluating and implementing new technology and changing media. The communication, culture and media concentration parallels requirements in Drexel's PhD program, and prepares students for doctoral level work in the field.

Throughout the curriculum, in all the concentration options, students may use electives to increase communication skills, to broaden theoretical backgrounds, or to further develop areas of specialization.

Students can attend full time or part time, they can begin the program in any academic quarter, and they can complete all coursework in the evening. The program emphasizes flexibility, encouraging each student, in consultation with a faculty advisor to fashion a particular course of study.

The program accommodates students from widely varying educational backgrounds; many have backgrounds in science and mathematics, and an equal number come from humanities-related areas. Some students pursue their degrees while already working at demanding jobs.

Admission Requirements

Applicants must meet the general requirements for admission to graduate studies. Applicants with a GPA below 3.0 must provide scores from the Graduate Record Examination. Prospective students must also submit with their applications a 1,500-word statement explaining why they want to enter the program. The program's screening committee carefully reads the essays to evaluate each applicant's writing skills and sense of purpose.

The program accommodates students from various backgrounds. For students without appropriate prior work experience, the program features a 6-month internship. For students applying with appropriate work experience, the internship requirement may be waived at the discretion of the Department's Graduate Committee.

Degree Requirements

Requirements

The MS degree requires 45.0 credits of coursework, a professional portfolio of three to five items developed by the student, and six months of internship for those who lack significant experience in communication related fields. For students in the communication, culture and media track, the internship may be a research internship done with a graduate faculty member.

Portfolio

As a final graduation requirement, each student must submit a professional exit portfolio. Based on coursework and professional assignments, the portfolio undergoes a rigorous process of review by faculty members and by a professional outside the university.

Internship

An internship is required and may be completed at any time during the student's tenure at Drexel. Students who need professional experience consult with their advisors and the program director to develop a suitable internship. Normally, this placement begins after the student has completed at least half the required coursework. Students who already have the equivalent of six months of professional experience or who

gain the equivalent by working part time during their course of study can request exemption from this requirement.

Required Courses

COM 500	Reading & Res Communication	3.0
COM 610	Theories of Communication and Persuasion	3.0
Electives *		24.0
Required Concentration Courses		**15.0**

Students must select and complete one of the following concentration options:

Technical Communication

COM 510	Technical Writing
COM 570	Technical and Science Editing
COM 612	Ethics for Science and Technical Communication
COM 620	Message Design and Evaluation
COM 630	Software Documentation

Science Communication

COM 520	Science Writing
COM 570	Technical and Science Editing
COM 612	Ethics for Science and Technical Communication
COM 620	Message Design and Evaluation
COM 670	Medical Writing

Public Communication

COM 613	Ethics for Public Communication
COM 635	Electronic Publishing
COM 650	Telecommunications Policy in the Information Age
COM 663	Event Planning
COM 680	Public Relations Writing and Strategies

Communication, Culture, and Media

COM 710	Mass Communication and American Social Thought
COM 715	Media, Advocacy and Public Spaces
COM 725	Political Communication
Select 2 of the following:	
COM 720	Critical Theory
COM 801	Seminar in Contemporary Theory
COM 802	Seminar in Discourse and Semiotics
COM 803	Seminar in Structural and Cultural Dynamics
COM 804	Seminar in Research Methodology
COM 805	Seminar in Communication Ethics
Total Credits	**45.0**

* Any appropriate graduate course offered in the University can serve as an elective if the student has sufficient background to take the course. In addition, the program offers its own elective courses including special topics (COM 690 (https://nextcatalog.drexel.edu/graduate/collegeofartsandsciences/communicationcultureandmedia)). Qualified students may also pursue independent study for elective credit in special cases.

Communication Faculty

Ronald Bishop, III, PhD *(Temple University)*. Professor. Investigative reporting, sports journalism, journalism history, journalism sourcing patterns, textual narrative and ideological analysis, cultural history of fame.

Joan W. Blumberg, BA *(Pennsylvania State University)*. Instructor. Publishing, electronic publishing, publishing and communications, publishing and mass-media.

Karen Cristiano, PhD *(Temple University) Assistant Department Head of Communication*. Associate Teaching Professor. Journalism, medical writing, feature writing, copy editing, mass media and society.

Paul Evangelista, PhD *(Temple University)*. Assistant Teaching Professor. Public relations, communication theory, new technologies in communication (classroom and online); business communication; electronic publishing; social media.

Richard Forney Instructor. Broadcast journalism technology and the effects of new technologies on personal and corporate communication skills.

Alexander Friedlander, PhD *(Carnegie Mellon University) Associate Dean for Undergraduate Education, College of Arts and Sciences*. Associate Professor. Rhetorical theory and practice, document design, writing and technology.

Julia Hagemann-May, PhD *(Drexel University)*. Assistant Teaching Professor. Political communication; international politics and its news coverage; public opinion; transatlantic relations; war, torture and human rights; debate in the public sphere.

Ernest A. Hakanen, PhD *(Temple University)*. Professor. Telecommunications policy, adolescent media use, communication theory and history, global media, and semiotics.

Barbara Jean Hoekje, PhD *(University of Pennsylvania) Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Frank Kelley, PhD *(Temple University)*. Associate Teaching Professor. Corporate university systems online, power structure of media enterprises, public relations, event planning.

Jordan McClain, PhD *(Temple University)*. Assistant Teaching Professor. Media framing and music journalism; relationship between television and music; American popular culture; celebrity, consumerism, and consumer behavior; branding, brand positioning, and advertising criticism.

Alexander Nikolaev, PhD *(Florida State University)*. Associate Professor. Public relations, political communication, organizational communication, mass communication, international communications and negotiations, communications theory.

Devon Powers, PhD *(New York University) Director, Communication Undergraduate Programs*. Associate Professor. Popular music, cultural intermediaries, promotional culture, 20th-century history, journalism studies.

David Ridgway, MS *(St. Joseph's University)*. Instructor. Deviant behaviors, social problems.

Rosemary Rys, MA. Instructor. Public relations and marketing.

Lawrence Souder, PhD *(Temple University).* Associate Teaching Professor. Science and technical writing, communication ethics, nonprofit communication.

Allan Stegeman, MA *(University of Houston).* Teaching Professor. Communication, technology and mass media, video.

Susan Stein, PhD *(University of Wisconsin) Director, Professional MS Programs.* Associate Teaching Professor. Science, environmental, and health communication

Asta Zelenkauskaite, PhD *(Indiana University).* Assistant Professor. Social media; user-generated content; computer-mediated communication; interactivity; active audience analysis; mobile communication; gender and online identity; prosumer culture; internet of things; quantitative/qualitative research.

Interdepartmental Faculty

Michelle Sahl, PhD, MEd, MBA, MBE *(The University of the Sciences in Philadelphia).* Assistant Teaching Professor. Health management and policy: management and leadership of health services organizations, urban health, and the history of health care systems.

Publishing

Major: Publishing
Degree Awarded: Master of Arts (MA)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 09.1001
Standard Occupational Classification (SOC) code: 27-3041

About the Program

Students are given a broad scope view of the Publishing Industry via courses taught by publishing professionals and experts in their fields. In addition to the ten required courses, students will take an additional five courses in the aspect of publishing that best suits their interests. Courses will be taught in traditional classrooms, as well as online in both synchronized and asynchronized sessions; special projects can occur in day and evening hours.

The required course list contains seven courses specific to the Publishing program, and three by other disciplines (Law, Business, and Digital Design). The elective list contains three courses specific to the program, and then a wide-range of courses from Communication, Visual Arts and Design, Business, and Law.

Independent Projects are encouraged and are limited only by the student's imagination or area of interest. Opportunities abound at Drexel itself, as well as many other area publishers with whom we've built relationships.

Degree Requirements

Required courses

PUB 530	The Publishing Environment	3.0
PUB 631	Publication Design: Print and Digital	3.0
PUB 635	Periodicals Publishing	3.0
PUB 730	Book Publishing	3.0
PUB 504	Drexel Publishing Group Special Projects	3.0
PUB 750	Small Press Development	3.0
PUB 720	The E-book and E-zine	3.0
MKTG 601	Marketing Strategy & Planning	3.0
WEST 500	Introduction to Digital Design Tools	3.0
LAW 603S	Media Law	3.0
Select five of the following:		**15.0**
COM 500	Reading & Res Communication	
COM 510	Technical Writing	
COM 520	Science Writing	
COM 530	Techniques and Science of Photography	
COM 540	Technical and Science Graphics	
COM 570	Technical and Science Editing	
COM 610	Theories of Communication and Persuasion	
COM 620	Message Design and Evaluation	
COM 640	Desktop Publishing	
COM 655	Ethnography of Communication	
COM 670	Medical Writing	
COM 675	Grant Writing for the Arts and Humanities	
COM T680	Special Topics in Communication	
LAW 602S	First Amendment	
LAW 760S	Copyright	
MGMT 601	Managing the Total Enterprise	
MKTG 630	Global Marketing	
ORGB 625	Leadership and Professional Development	
PUB 599	Independent Study in Publishing	
PUB 701	Independent Project in Publishing	
PUB T680	Special Topics in Publishing	
Total Credits		**45.0**

Sample Plan of Study

Term 1		Credits
PUB 530	The Publishing Environment	3.0
PUB 631	Publication Design: Print and Digital	3.0
	Term Credits	**6.0**
Term 2		
PUB 635	Periodicals Publishing	3.0
PUB 730	Book Publishing	3.0
MKTG 601	Marketing Strategy Planning	3.0
	Term Credits	**9.0**
Term 3		
PUB 750	Small Press Development	3.0
PUB T680	Special Topics in Publishing	3.0
	Term Credits	**6.0**
Term 4		
PUB 504	Drexel Publishing Group Special Projects	3.0
Elective		3.0
	Term Credits	**6.0**
Term 5		
Elective		3.0
LAW 603S	Media Law	3.0

WEST 500	Introduction to Digital Design Tools	3.0
	Term Credits	**9.0**
Term 6		
PUB 720	The E-book and E-zine	3.0
PUB 701	Independent Project in Publishing	3.0
PUB 599	Independent Study in Publishing	3.0
	Term Credits	**9.0**

Total Credit: 45.0

Computer Engineering

Major: Computer Engineering
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 - 48.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.0901
Standard Occupational Classification (SOC) code: 15-1132; 15-1133; 15-1143; 17-2031

About the Program

The computer engineering curriculum is designed to: (1) address the needs of students with a variety of different backgrounds; (2) ensure that graduates will have adequate knowledge and skills in at least one area of specialization; (3) meet the immediate needs of working students as well as to adequately prepare full-time students for a real-world technological environment; and (4) equip students with tools to grasp and develop new technologies and trends.

The Master of Science in Computer Engineering degree requires a minimum of 45.0 approved credits chosen in accordance with a plan of study arranged in consultation with the student's advisor and the departmental graduate advisor. Up to but not exceeding 9.0 research/thesis credits may be taken by students who choose to write a master's thesis. Students who elect a non-thesis option are also encouraged to engage in research, by registering for supervised research credits (not to exceed 9.0 credits).

For more information, visit the Department of Electrical and Computer Engineering (http://www.ece.drexel.edu) web site.

Admission Requirements

Applicants should preferably have an undergraduate degree equivalent to a US bachelor's degree in computer engineering, computer science, or electrical engineering. Students holding degrees in other engineering and science disciplines with appropriate coursework or training will also be considered.

Appropriate coursework includes experience with all of the following: Software (advanced programming and operating systems); Computer Architecture (digital systems design, computer organization and architecture); Algorithms and Data Structures; Computer Networks. Students must have a minimum 3.0 GPA (on a 4.0 scale) for the last two years of undergraduate studies, as well as for any subsequent graduate-level work.

The GRE General Test is required of applicants to full-time MS and PhD programs. Students whose native language is not English and who do not hold a degree from a US institution must take the Test of English as a Foreign Language (TOEFL).

For additional information on how to apply, visit Drexel's Admissions page for Computer Engineering (http://www.drexel.edu/grad/programs/coe/computer-engineering).

Master of Science in Computer Engineering

The Master of Science in Computer Engineering curriculum encompasses 45.0 or 48.0 (with the Graduate Co-op option) approved credit hours, chosen in accordance with the following requirements and a plan of study arranged with the departmental graduate advisor in consultation with the student's research advisor, if applicable. Before the end of the first quarter in the Department of Electrical and Computer Engineering, for a full-time student, or by the end of the first year for a part-time student, said plan of study must be filed and approved with the departmental graduate advisor.

A total of at least 30.0 credit hours must be taken from among the graduate course offerings of the Department of Electrical and Computer Engineering. These credits must be taken at Drexel University. No transfer credit may be used to fulfill these requirements, regardless of content equivalency.

The remaining courses needed to reach the minimum credit hour requirement for the degree program are considered elective courses. Elective courses can be chosen from among the graduate course offerings of the Department of Electrical and Computer Engineering; other departments within the College of Engineering; the School of Biomedical Science, Engineering and Health Systems; the Department of Mathematics; the Department of Physics; the Department of Chemistry and the Department of Biology. In order to have courses outside of these departments and schools count towards degree completion, they must be approved by the departmental graduate advisors prior to registration for said courses.

Please note that ECEC 500 (Fundamentals of Computer Hardware) and ECEC 600 (Fundamentals of Computer Networks) do **not** count toward the credit requirements to complete the MS in Electrical Engineering degree program.

Computer Engineering (ECEC) Courses	21.0
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses	9.0
Elective Courses	15.0
Total Credits	**45.0**

Options for Degree Fulfillment

Although not required, students are encouraged to complete a Master's Thesis as part of the MS studies. Those students who choose the thesis option may count up to 9.0 research/thesis credits as part of their required credit hour requirements.

Students may choose to participate in the Graduate Co-Op Program, where 6.0 credit hours can be earned for a six month co-operative education experience in industry, working on curriculum related projects. The total number of required credit hours is increased to 48.0 for those students who choose to pursue the Graduate Co-Op option. This change represents an increase in non-departmental required credit hours to a total of 18.0 credit hours, 6.0 of which are earned from the cooperative education experience.

For more information on curricular requirements, visit the Department of Electrical and Computer Engineering' (http://www.ece.drexel.edu)s web site.

PhD in Electrical Engineering

General Requirements

The following general requirements must be satisfied in order to complete the PhD in Electrical Engineering:

- 90.0 credit hours total
- candidacy examination
- research proposal
- dissertation defense

Students entering with a master's degree in electrical or computer engineering or a related field will be considered a post-masters PhD student and will only be required to complete a total of 45.0 credit hours, in accordance with University policy.

Curriculum

Appropriate coursework is chosen in consultation with the student's research advisor. A plan of study must be developed by the student to encompass the total number of required credit hours. Both the departmental graduate advisor and the student's research advisor must approve this plan.

Candidacy Examination

The candidacy examination explores the depth of understanding of the student in his/her specialty area. The student is expected to be familiar with, and be able to use, the contemporary tools and techniques of the field and to demonstrate familiarity with the principal results and key findings.

The student, in consultation with his/her research advisor, will declare a principal technical area for the examination. The examination includes the following three parts:

- A self-study of three papers from the archival literature in the student's stated technical area, chosen by the committee in consultation with the student.

- A written report (15 pages or less) on the papers, describing their objectives, key questions and hypotheses, methodology, main results and conclusions. Moreover, the student must show in an appendix independent work he/she has done on at least one of the papers – such as providing a full derivation of a result or showing meaningful examples, simulations or applications.

- An oral examination which takes the following format:

  - A short description of the student's principal area of interest (5 minutes, by student).
  - A review of the self-study papers and report appendix (25-30 minutes, by students).
  - Questions and answers on the report, the appendix and directly related background (40-100 minutes, student and committee).

In most cases, the work produced during the candidacy examination will be a principal reference for the student's PhD dissertation; however, this is not a requirement.

Research Proposal

Each student, after having attained the status of PhD Candidate, must present a research proposal to a committee of faculty and industry members, chosen with his/her research advisor, who are knowledgeable in the specific area of research. This proposal should outline the specific intended subject of study; i.e., it should present a problem statement, pertinent background, methods of study to be employed, expected difficulties and uncertainties and the anticipated form, substance and significance of the results.

The purpose of this presentation is to verify suitability of the dissertation topic and the candidate's approach, and to obtain the advice and guidance of oversight of mature, experienced ECE investigators. It is not to be construed as an examination, though approval by the committee is required before extensive work is undertaken. The thesis proposal presentation must be open to all; announcements regarding the proposal presentation must be made in advance.

The thesis advisory committee will have the sole responsibility of making any recommendations regarding the research proposal. It is strongly recommended that the proposal presentation be given as soon as possible after the successful completion of the candidacy examination.

Dissertation Defense

Dissertation Defense procedures are described in the Office of Graduate Studies policies regarding Doctor of Philosophy Program Requirements (http://www.drexel.edu/provost/graduatestudies). The student must be a PhD candidate for at least one year before he/she can defend his/her doctoral thesis.

Dual Degree

The ECE Department offers outstanding students the opportunity to receive two diplomas (BS and MS) at the same time. The program requires five (5) years to complete. Participants, who are chosen from the best undergraduates students, work with a faculty member on a research project and follow a study plan that includes selected graduate classes. This program prepares individuals for careers in research and development; many of its past graduates continued their studies toward a PhD.

For more information on eligibility, academic requirements, and tuition policy visit the Engineering Combined BS/MS (http://www.ece.drexel.edu/undergrad/bsms.html) page.

Facilities

Drexel University and the Electrical and Computer Engineering Department are nationally recognized for a strong history of developing innovative research. Research programs in the ECE Department prepare students for careers in research and development, and aim to endow graduates with the ability to identify, analyze, and address new technical and scientific challenges. The ECE Department is well equipped with state-of-the-art facilities in each of the following ECE Research laboratories:

Research Laboratories at the ECE Department

Adaptive Signal Processing and Information Theory Research Group

The Adaptive Signal Processing and Information Theory Research Group (http://www.ece.drexel.edu/walsh/aspitrg/home.html) conducts research in the area of signal processing and information theory. Our main interests are belief/expectation propagation, turbo decoding and composite adaptive system theory. We are currently doing projects on the following topics:

i) Delay mitigating codes for network coded systems,
ii) Distributed estimation in sensor networks via expectation propagation,
iii) Turbo speaker identification,
iv) Performance and convergence of expectation propagation,
v) Investigating bounds for SINR performance of autocorrelation based channel shorteners.

Applied Networking Research Lab

Applied Networking Research Lab (ANRL) projects focus on modeling and simulation as well as experimentation in wired, wireless and sensor networks. ANRL is the home of MuTANT, a Multi-Protocol Label Switched Traffic Engineering and Analysis Testbed composed of 10 high-end Cisco routers and several PC-routers, also used to study other protocols in data networks as well as automated network configuration and management. The lab also houses a sensor network testbed.

Bioimage Laboratory

Uses computer gaming hardware for enhanced and affordable 3-D visualization, along with techniques from information theory and machine learning to combine the exquisite capabilities of the human visual system with computational sensing techniques for analyzing vast quantities of image sequence data.

Data Fusion Laboratory

The Data Fusion Laboratory investigates problems in multisensory detection and estimation, with applications in robotics, digital communications, radar, and target tracking. Among the projects in progress: computationally efficient parallel distributed detection architectures, data fusion for robot navigation, modulation recognition and RF scene analysis in time-varying environments, pattern recognition in biological data sequences and large arrays, and hardware realizations of data fusion architectures for target detection and target tracking.

Drexel Network Modeling Laboratory

The Drexel Network Modeling Laboratory investigates problems in the mathematical modeling of communication networks, with specific focus on wireless ad hoc networks, wireless sensor networks, and supporting guaranteed delivery service models on best effort and multipath routed networks. Typical methodologies employed in our research include mathematical modeling, computer simulation, and performance optimization, often with the end goal of obtaining meaningful insights into network design principles and fundamental performance tradeoffs.

Drexel Power-Aware Computing Laboratory

The Power-Aware Computing Lab (http://dpac.ece.drexel.edu) investigates methods to increase energy efficiency across the boundaries of circuits, architecture, and systems. Our recent accomplishments include the Sigil profiling tool, scalable modeling infrastructure for accelerator implementations, microarchitecture-aware VDD gating algorithms, an accelerator architecture for ultrasound imaging, evaluation of hardware reference counting, hardware and operating system support for power-agile computing, and memory systems for accelerator-based architectures.

Drexel University Nuclear Engineering Education Laboratory

The field of nuclear engineering encompasses a wide spectrum of occupations, including nuclear reactor design, medical imaging, homeland security, and oil exploration. The Drexel University Nuclear Engineering Education Laboratory (DUNEEL) provides fundamental hands on understanding for power plant design and radiation detection and analysis. Software based study for power plant design, as well as physical laboratory equipment for radiation detection, strengthen the underlying concepts used in nuclear engineering such that the student will comprehend and appreciate the basic concepts and terminology used in various nuclear engineering professions. Additionally, students use the laboratory to develop methods for delivering remote, live time radiation detection and analysis. The goal of DUNEEL is to prepare students for potential employment in the nuclear engineering arena.

Drexel VLSI Laboratory

The Drexel VLSI Laboratory (http://ece.drexel.edu/faculty/taskin/wiki/vlsilab/index.php/Main_Page) investigates problems in the design, analysis, optimization and manufacturing of high performance (low power, high throughput) integrated circuits in contemporary CMOS and emerging technologies. Suited with industrial design tools for integrated circuits, simulation tools and measurement beds, the VLSI group is involved with digital and mixed-signal circuit design to verify the functionality of the discovered novel circuit and physical design principles. The Drexel VLSI laboratory develops design methodologies and automation tools in these areas, particularly in novel clocking techniques, featuring resonant clocking, and interconnects, featuring wireless interconnects.

Drexel Wireless Systems Laboratory

The Drexel Wireless Systems Laboratory (DWSL) contains an extensive suite of equipment for constructing, debugging, and testing prototype wireless communications systems. Major equipment within DWSL includes:

- three software defined radio network testbeds (HYDRA, USRP, and WARP) for rapidly prototyping radio, optical and ultrasonic communications systems,
- a TDK RF anechoic chamber and EMSCAN desktop antenna pattern measurement system,
- a materials printer and printed circuit board milling machine for fabricating conformal antennas and
- wireless protocol conformance testing equipment from Aeroflex.

The lab is also equipped with network analyzers, high speed signal generators, oscilloscopes, and spectrum analyzers as well as several Zigbee development platforms for rapidly prototyping sensor networks.

DWSL personnel also collaborate to create wearable, fabric based transceivers through collaboration with the Shima Seiki Haute Laboratory in the Drexel ExCITe Center. The knitting equipment at Drexel includes sixteen SDS-ONE APEX3 workstations and four state-of-the-art knitting machines. The workstations accurately simulate fabric construction and provide researchers and designers the opportunity to program, create and simulate textile prototypes, import CAD specifications of final products,

and produce made-to-measure or mass-produced pieces on Shima Seiki knitting machines. For testing smart textiles for biomedical, DWSL personnel also have collaborators in the Center for Interdisciplinary Clinical Simulation and Practice (CICSP) in the Drexel College of Medicine which provides access to medical mannequin simulators.

Ecological and Evolutionary Signal-processing and Informatics Laboratory

The Ecological and Evolutionary Signal-processing and Informatics Laboratory (EESI) (http://www.ece.drexel.edu/gailr/EESI) seeks to solve problems in high-throughput genomics and engineer better solutions for biochemical applications. The lab's primary thrust is to enhance the use of high-throughput DNA sequencing technologies with pattern recognition and signal processing techniques. Applications include assessing the organism content of an environmental sample, recognizing/classifying potential and functional genes, inferring environmental factors and inter-species relationships, and inferring microbial evolutionary relationships from short-read DNA/RNA fragments. The lab also investigates higher-level biological systems such as modeling and controlling chemotaxis, the movement of cells.

Electric Power Engineering Center

This newly established facility makes possible state-of-the-art research in a wide variety of areas, ranging from detailed theoretical model study to experimental investigation in its high voltage laboratories. The mission is to advance and apply scientific and engineering knowledge associated with the generation, transmission, distribution, use, and conservation of electric power. In pursuing these goals, this center works with electric utilities, state and federal agencies, private industries, nonprofit organizations and other universities on a wide spectrum of projects. Research efforts, both theoretical and experimental, focus on the solution of those problems currently faced by the electric power industry. Advanced concepts for electric power generation are also under investigation to ensure that electric power needs will be met at the present and in the future.

Electronic Design Automation Facility

Industrial-grade electronic design automation software suite and intergrated design environment for digital, analog and mixed-signal systems development. Field Programmable Gate Array (FPGA) development hardware. Most up-to-date FPGA/embedded system development hardware kits. Printed circuit board production facility. Also see Drexel VLSI Laboratory.

Microwave-Photonics Device Laboratories

The laboratory is equipped with test and measurement equipment for high-speed analog and digital electronics and fiber optic systems. The test equipment includes network analyzers from Agilent (100kHz- 1.3 GHz and 45 Mhz-40 GHz), and Anritsu (45 MHz-6 GHz); spectrum analyzers from Tektronix, HP, and Agilent with measurement capability of DC to 40 GHz and up to 90 GHz using external mixers; signal generators and communication channel modulators from HP, Rhode-Schwartz, Systron Donner, and Agilent; microwave power meter and sensor heads, assortment of passive and active microwave components up to 40 GHz ; data pattern generator and BER tester up to 3Gb/s; optical spectrum analyzer from Anritsu and power meters from HP; single and multimode fiber optic based optical transmitter and receiver boards covering ITU channels at data rates up to 10Gb/s; passive optical components such as isolator, filter, couplers, optical connectors and fusion splicer; LPKF milling machine for fabrication of printed circuit boards; wire-bonding and Cascade probe stations; Intercontinental test fixtures for testing of

MMIC circuits and solid-state transistors; state-of-the-art microwave and electromagnetic CAD packages such as Agilent ADS, ANSYS HFSS, and COMSOL multi-physics module.

Music and Entertainment Technology Laboratory

The Music and Entertainment Technology Laboratory (MET-lab) is devoted to research in digital media technologies that will shape the future of entertainment, especially in the areas of sound and music. We employ digital signal processing and machine learning to pursue novel applications in music information retrieval, music production and processing technology, and new music interfaces. The MET-lab is also heavily involved in outreach programs for K-12 students and hosts the Summer Music Technology program, a one-week learning experience for high school students. Lab facilities include a sound isolation booth for audio and music recording, a digital audio workstation running ProTools, two large multi-touch display interfaces of our own design, and a small computing cluster for distributed processing.

NanoPhotonics+ Lab (http://drexelnanophotonics.com)

Our research is primarily in the area of nanophotonics with a focus on the nanoscale interaction of light with matter. Interests include: liquid crystal/polymer composites for gratings, lenses and HOEs; liquid crystal interactions with surfaces and in confined nanospaces; alternative energy generation through novel photon interactions; ink-jet printed conducting materials for RF and photonic applications; and the creation and development of smart textiles technologies including soft interconnects, sensors, and wireless implementations.

Opto-Electro-Mechanical Laboratory

This lab concentrates on the system integration on optics, electronics, and mechanical components and systems, for applications in imaging, communication, and biomedical research. Research areas include: Programmable Imaging with Optical Micro-electrical-mechanical systems (MEMS), in which microscopic mirrors are used to image light into a single photodetector; Pre-Cancerous Detection using White Light Spectroscopy, which performs a cellular size analysis of nuclei in tissue; Free-space Optical Communication using Space Time Coding, which consists of diffused light for computer-to-computer communications, and also tiny lasers and detectors for chip-to-chip communication; Magnetic Particle Locomotion, which showed that particles could swim in a uniform field; and Transparent Antennas using Polymer, which enables antennas to be printed through an ink-jet printer.

Plasma and Magnetics Laboratory

Research is focused on applications of electrical and magnetic technologies to biology and medicine. This includes the subjects of non-thermal atmospheric pressure plasma for medicine, magnetic manipulation of particles for drug delivery and bio-separation, development of miniature NMR sensors for cellular imaging and carbon nanotube cellular probes.

Power Electronics Research Laboratory

The Power Electronics Research Laboratory (PERL) is involved in circuit and design simulation, device modeling and simulation, and experimental testing and fabrication of power electronic circuits. The research and development activities include electrical terminations, power quality, solar photovoltaic systems, GTO modeling, protection and relay coordination, and solid-state circuit breakers. The analysis tools include EMPT, SPICE, and others, which have been modified to incorporate models of such controllable solid-state switches as SCRs, GTOs, and MOSFETs. These

programs have a wide variety and range of modeling capabilities used to model electromagnetics and electromechanical transients ranging from microseconds to seconds in duration. The PERL is a fully equipped laboratory with 42 kVA AC and 70 kVA DC power sources and data acquisition systems, which have the ability to display and store data for detailed analysis. Some of the equipment available is a distribution and HV transformer and three phase rectifiers for power sources and digital oscilloscopes for data measuring and experimental analysis. Some of the recent studies performed by the PERL include static VAR compensators, power quality of motor controllers, solid-state circuit breakers, and power device modeling which have been supported by PECO, GE, Gould, and EPRI.

RE Touch Lab

The RE Touch Lab is investigating the perceptual and mechanical basis of active touch perception, or haptics, and the development of new technologies for stimulating the sense of touch, allowing people to touch, feel, and interact with digital content as seamlessly as we do with objects in the real world. We study the scientific foundations of haptic perception and action, and the neuroscientific and biomechanical basis of touch, with a long-term goal of uncovering the fundamental perceptual and mechanical computations that enable haptic interaction. We also create new technologies for rendering artificial touch sensations that simulate those that are experienced when interacting with real objects, inspired by new findings on haptic perception.

Testbed for Power-Performance Management of Enterprise Computing Systems

This computing testbed is used to validate techniques and algorithms aimed at managing the performance and power consumption of enterprise computing systems. The testbed comprises a rack of Dell 2950 and Dell 1950 PowerEdge servers, as well as assorted desktop machines, networked via a gigabit switch. Virtualization of this cluster is enabled by VMWare's ESX Server running the Linux RedHat kernel. It also comprises of a rack of ten Apple Xserve machines networked via a gigabit switch. These servers run the OS X Leopard operating systems and have access to a RAID with TBs of total disk capacity.

Electrical and Computer Engineering Faculty

Fernand Cohen, PhD *(Brown University)*. Professor. Surface modeling; tissue characterization and modeling; face modeling; recognition and tracking.

Kapil Dandekar, PhD *(University of Texas-Austin) Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean of Research, College of Engineering.* Professor. Cellular/mobile communications and wireless LAN; smart antenna/MIMO for wireless communications; applied computational electromagnetics; microwave antenna and receiver development; free space optical communication; ultrasonic communication; sensor networks for homeland security; ultrawideband communication.

Afshin Daryoush, ScD *(Drexel University)*. Professor. Digital and microwave photonics; nonlinear microwave circuits; RFIC; medical imaging.

Bruce A. Eisenstein, PhD *(University of Pennsylvania) Interim Dean, College of Engineering.* Professor. Pattern recognition; estimation; decision theory.

Adam K. Fontecchio, PhD *(Brown University) Electrical and Computer Engineering.* Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Gary Friedman, PhD *(University of Maryland-College Park)*. Professor. Biological and biomedical applications of nanoscale magnetic systems.

Eli Fromm, PhD *(Jefferson Medical College) Roy A. Brothers University Professor / Director for Center of Educational Research.* Professor. Engineering education; academic research policy; bioinstrumentation; physiologic systems.

Edwin L. Gerber, PhD *(University of Pennsylvania) Assistant Department Head for Evening Programs.* Professor. Computerized instruments and measurements; undergraduate engineering education.

Allon Guez, PhD *(University of Florida)*. Professor. Intelligent control systems; robotics, biomedical, automation and manufacturing; business systems engineering.

Mark Hempstead, PhD *(Harvard University) Junior Colehower Chair.* Assistant Professor. Computer engineering; power-aware computing; computer architecture; low power VLSI Design; wireless sensor networks.

Peter R. Herczfeld, PhD *(University of Minnesota) Lester A. Kraus Professor/Director, Center for Microwave/Lightwave Engineering.* Professor. Lightwave technology; microwaves; millimeter waves; fiberoptic and integrated optic devices.

Leonid Hrebien, PhD *(Drexel University) Graduate Advisor and Assistant Department Head for Graduate Affairs.* Professor. Tissue excitability; acceleration effects on physiology; bioinformatics.

Paul R. Kalata, PhD *(Illinois Institute of Technology)*. Associate Professor. Stochastic and adaptive control theory; identification and decision theory; Kalman filters.

Moshe Kam, PhD *(Drexel University) Robert G. Quinn Professor of Electrical and Computer Engineering and Department Head.* Professor. Decision fusion and sensor fusion; mobile robots (especially robot navigation); pattern recognition (especially in handwriting applications); optimization and control.

Nagarajan Kandasamy, PhD *(University of Michigan)*. Associate Professor. Embedded systems, self-managing systems, reliable and fault-tolerant computing, distributed systems, computer architecture, and testing and verification of digital systems.

Bruce Katz, PhD *(University of Illinois)*. Adjunct Professor. Speech communication and computer science; artificial intelligence.

Youngmoo Kim, PhD *(MIT)*. Associate Professor. Audio and music signal processing, voice analysis and synthesis, music information retrieval, machine learning.

Timothy P. Kurzweg, PhD *(University of Pittsburgh)*. Associate Professor. Optical MEM modeling and simulation; system-level simulation; computer architecture.

Karen Miu, PhD *(Cornell University)*. Professor. Power systems; distribution networks; distribution automation; optimization; system analysis.

Bahram Nabet, PhD *(University of Washington) Associate Dean for Special Projects, College of Engineering; Electrical and Computer*

Engineering. Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Prawat Nagvajara, Ph.D. *(Boston University).* Associate Professor. System on a chip; embedded systems; power grid computation; testing of computer hardware; fault-tolerant computing; VLSI systems; error control coding.

Dagmar Niebur, Ph.D. *(Swiss Federal Institute of Technology).* Associate Professor. Intelligent systems; dynamical systems; power system monitoring and control.

Chika Nwankpa, PhD *(Illinois Institute of Technology).* Professor. Power system dynamics; power electronic switching systems; optically controlled high power switches.

Karkal S. Prahbu, PhD *(Harvard University).* Auxiliary Professor. Computer and software engineering; advanced microprocessors and distributed operating systems.

Gail L. Rosen, PhD *(Georgia Institute of Technology).* Associate Professor. Signal processing, signal processing for biological analysis and modeling, bio-inspired designs, source localization and tracking.

Kevin J. Scoles, PhD *(Dartmouth College) Associate Dean, College of Engineering, Office of Student Services.* Associate Professor. Microelectronics; electric vehicles; solar energy; biomedical electronics.

Harish Sethu, PhD *(Lehigh University).* Associate Professor. Protocols, architectures and algorithms in computer networks; computer security; mobile ad hoc networks; large-scale complex adaptive networks and systems.

P. Mohana Shankar, PhD *(Indian Institute of Technology) Allen Rothwarf Professor of Electrical and Computer Engineering.* Professor. Wireless communications; biomedical ultrasonics; fiberoptic bio-sensors.

Baris Taskin, PhD *(University of Pittsburgh).* Associate Professor. Electronic design automation (EDA) of integrated circuits, high-performance VLSI circuits and systems, sequential circuit timing and synchronization, system-on-chip (SOC) design, operational research, VLSI computer-aided design.

Lazar Trachtenberg, DSc *(Israel Institute of Technology).* Professor. Fault tolerance; multi-level logic synthesis; signal processing; suboptimal filtering.

Oleh Tretiak, ScD *(MIT) Robert C. Disque Professor of Electrical and Computer Engineering.* Professor. Image processing; tomography; image registration; pattern recognition.

John MacLaren Walsh, PhD *(Cornell University).* Assistant Professor. Performance and convergence of belief/expectation propagation and turbo decoding/equalization/synchronization, permeation models for ion channels, composite adaptive systems theory.

Steven Weber, PhD *(University of Texas-Austin) Assistant Department Head for Graduate Affairs, Electrical and Computer Engineering.* Associate Professor. Mathematical modeling of computer and communication networks, specifically streaming multimedia and ad hoc networks.

Jaudelice Cavalcante de Oliveira, PhD *(Georgia Institute of Technology).* Associate Professor. Next generation Internet; quality of service in computer communication networks; wireless networks.

Interdepartmental Faculty

Dov Jaron, PhD *(University of Pennsylvania) Calhoun Distinguished Professor of Engineering in Medicine.* Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Jeremy R. Johnson, PhD *(Ohio State University).* Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

John Lacontora, PhD *(New Jersey Institute of Technology).* Associate Research Professor. Service engineering; industrial engineering.

Ryszard Lec, PhD *(University of Warsaw Engineering College).* Professor. Biomedical applications of visoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Spiros Mancoridis, PhD *(University of Toronto) Interim Department Head, Computer Science.* Professor. Software engineering; software security; code analysis; evolutionary computation.

Karen Moxon, PhD *(University of Colorado).* Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Paul Y. Oh, PhD *(Columbia University) Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics.* Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Banu Onaral, Ph.D. *(University of Pennsylvania) H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems.* Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD *(Rensselaer Polytechnic University).* Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

William C. Regli, PhD *(University of Maryland-College Park).* Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Arye Rosen, PhD *(Drexel University) Biomedical Engineering and Electrical Engineering.* Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Jonathan E. Spanier, PhD *(Columbia University) Associate Dean, Strategic Planning, College of Engineering.* Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Aydin Tozeren, PhD *(Columbia University) Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems.* Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Aspasia Zerva, PhD *(University of Illinois).* Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Emeritus Faculty

Richard L. Coren, PhD *(Polytechnic Institute of Brooklyn)*. Professor Emeritus. Electromagnetic fields, antennas, shielding, RFI, cybernetics of evolving systems.

Robert Fischl, PhD *(University of Michigan) John Jarem Professor Emeritus / Director, Center for Electric Power Engineering*. Professor Emeritus. Power: systems, networks, controls, computer-aided design, power systems, solar energy.

Vernon L. Newhouse, PhD *(University of Leeds) Disque Professor Emeritus*. Professor Emeritus. Biomedical and electrophysics: ultrasonic flow measurement, imaging and texture analysis in medicine, ultrasonic nondestructive testing and robot sensing, clinical engineering.

Hun H. Sun, PhD *(Cornell University) Ernest O. Lange Professor Emeritus*. Professor Emeritus. Systems and signals in biomedical control systems.

Cybersecurity

Major: Cybersecurity
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0 (or 48.0 credits for the 6-month graduate co-op option)
Classification of Instructional Programs (CIP) code: 11.1003
Standard Occupational Classification (SOC) code: 15-1122

About the Program

As a greater percentage of people worldwide use computers, there is a marked increase in cybersecurity concerns. Motivated through discussions with the National Security Agency (NSA), Drexel University's MS in Cybersecurity program prepares students with both academic and practical training to be competitive in today's rapidly changing technical landscape. The program provides deeply technical and specialized training and enables graduates to understand, adapt, and develop new techniques to confront emerging threats in cybersecurity.

Administered by the Electrical (http://drexel.edu/engineering/departments/electrical_comp) & Computer Engineering Department (http://drexel.edu/engineering/departments/electrical_comp) in the College of Engineering, this program is interdisciplinary in nature and includes courses from Drexel University's College of Computing & Informatics. Topics covered include computer networking, probability concepts, techniques for analyzing algorithms, dependable software design, reverse software engineering, intrusion detection, ethics, privacy, confidentiality, authenticity, and social networking.

The program offers multidisciplinary "research rotations" as an independent study component of the degree program, and a graduate co-op option for credit.

Additional Information

For additional information about this program, please visit the ECE Department's Cybersecurity degree page (http://drexel.edu/engineering/programs/grad/CyberSecurity).

Degree Requirements

The Master of Science in Cybersecurity program encompasses a minimum of 45.0 or 48.0 (with the 6-month graduate co-op option)

approved credit hours, chosen in accordance with the requirements listed below. A plan of study should be arranged with the departmental graduate advisors, and in consultation with the student's research advisor, if applicable.

The required core courses provide students with a theoretical foundation in the field of cybersecurity and a framework to guide the application of knowledge gained in technical electives to the practice of cybersecurity.

Core Courses		
CST 510	Ethics, Privacy and Legal Issues	3.0
INFO 517	Principles of Cybersecurity	3.0
INFO 725	Information Policy	3.0
Networking Foundation		3.0
CS 544	Computer Networks	
or ECEC 631	Principles of Computer Networking	
Mathematical Foundations		3.0
CS 521	Data Structures and Algorithms I	
or ECES 521	Probability & Random Variables	
Cybersecurity Technical Electives [*]		18.0
General Electives [**]		12.0
Total Credits		45.0

[*]   Cybersecurity technical electives are used to build a deep understanding of one or more areas of technical expertise within the field of cybersecurity. All students are required to take a minimum of 18.0 credits of cybersecurity technical electives from the graduate course offerings of the Department of Computer Science, the Department of Computing and Security Technology, and the Department of Electrical and Computer Engineering.

[**]   General electives are the remaining courses needed to reach the minimum credit hour requirement for the degree program. General electives can be chosen from among the graduate course offerings of the College of Computing & Informatics; the Department of Computer Science; the Department of Computing and Security Technology; the Department of Electrical and Computer Engineering, and the Department of Mathematics. In order to have courses outside of these departments and schools count towards degree completion, they must be approved by the departmental graduate advisors prior to registration for said courses.

Graduate Co-op/Career Opportunities

Graduate Co-Op

Students may choose to participate in the graduate co-op program, working on curriculum related projects. Up to 6.0 credit hours can be earned for a six month full-time cooperative education experience in the industry. There are two options. Students participating in a three month full-time co-op experience earn 3.0 credits, which is the equivalent of one general elective course. Students engaging in a six month full-time co-op experience earn 6.0 credits, of which 3.0 credits is be considered equivalent to a general elective course; the other 3 credits are considered an additional course, increasingthe total minimum credit requirement for graduation from the MS program with a six month full-time graduate co-op to 48.0 credits.

Further information on the Graduate Co-Op Program (http://www.drexel.edu/scdc/coop/graduate) is available at the Drexel Steinbright Career Development Center. (http://www.drexel.edu/scdc)

Career Opportunities

The program was deliberately designed to address needs of the Federal Cyber Service, the Department of Defense, and the National Security Agency. The program strengthens ties between these agencies and Drexel University and will provide professional opportunities for students pursuing this degree.

Research

Students in the MS in Cybersecurity program have opportunities to perform research-oriented coursework for academic credit. Research-oriented coursework can be divided into three categories: research rotations, master's thesis, and independent research.

A total of 9.0 credits of research-oriented coursework may be counted towards the minimum credit hour requirement of the degree program. These credits are considered general electives.

Facilities

Drexel University and the Electrical and Computer Engineering Department are nationally recognized for a strong history of developing innovative research. Research programs in the ECE Department prepare students for careers in research and development, and aim to endow graduates with the ability to identify, analyze, and address new technical and scientific challenges. The ECE Department is well equipped with state-of-the-art facilities in each of the following ECE Research laboratories:

Research Laboratories at the ECE Department

Adaptive Signal Processing and Information Theory Research Group

The Adaptive Signal Processing and Information Theory Research Group (http://www.ece.drexel.edu/walsh/aspitrg/home.html) conducts research in the area of signal processing and information theory. Our main interests are belief/expectation propagation, turbo decoding and composite adaptive system theory. We are currently doing projects on the following topics:
i) Delay mitigating codes for network coded systems,
ii) Distributed estimation in sensor networks via expectation propagation,
iii) Turbo speaker identification,
iv) Performance and convergence of expectation propagation,
v) Investigating bounds for SINR performance of autocorrelation based channel shorteners.

Applied Networking Research Lab

Applied Networking Research Lab (ANRL) projects focus on modeling and simulation as well as experimentation in wired, wireless and sensor networks. ANRL is the home of MuTANT, a Multi-Protocol Label Switched Traffic Engineering and Analysis Testbed composed of 10 high-end Cisco routers and several PC-routers, also used to study other protocols in data networks as well as automated network configuration and management. The lab also houses a sensor network testbed.

Bioimage Laboratory

Uses computer gaming hardware for enhanced and affordable 3-D visualization, along with techniques from information theory and machine learning to combine the exquisite capabilities of the human visual system with computational sensing techniques for analyzing vast quantities of image sequence data.

Data Fusion Laboratory

The Data Fusion Laboratory investigates problems in multisensory detection and estimation, with applications in robotics, digital communications, radar, and target tracking. Among the projects in progress: computationally efficient parallel distributed detection architectures, data fusion for robot navigation, modulation recognition and RF scene analysis in time-varying environments, pattern recognition in biological data sequences and large arrays, and hardware realizations of data fusion architectures for target detection and target tracking.

Drexel Network Modeling Laboratory

The Drexel Network Modeling Laboratory investigates problems in the mathematical modeling of communication networks, with specific focus on wireless ad hoc networks, wireless sensor networks, and supporting guaranteed delivery service models on best effort and multipath routed networks. Typical methodologies employed in our research include mathematical modeling, computer simulation, and performance optimization, often with the end goal of obtaining meaningful insights into network design principles and fundamental performance tradeoffs.

Drexel Power-Aware Computing Laboratory

The Power-Aware Computing Lab (http://dpac.ece.drexel.edu) investigates methods to increase energy efficiency across the boundaries of circuits, architecture, and systems. Our recent accomplishments include the Sigil profiling tool, scalable modeling infrastructure for accelerator implementations, microarchitecture-aware VDD gating algorithms, an accelerator architecture for ultrasound imaging, evaluation of hardware reference counting, hardware and operating system support for power-agile computing, and memory systems for accelerator-based architectures.

Drexel University Nuclear Engineering Education Laboratory

The field of nuclear engineering encompasses a wide spectrum of occupations, including nuclear reactor design, medical imaging, homeland security, and oil exploration. The Drexel University Nuclear Engineering Education Laboratory (DUNEEL) provides fundamental hands on understanding for power plant design and radiation detection and analysis. Software based study for power plant design, as well as physical laboratory equipment for radiation detection, strengthen the underlying concepts used in nuclear engineering such that the student will comprehend and appreciate the basic concepts and terminology used in various nuclear engineering professions. Additionally, students use the laboratory to develop methods for delivering remote, live time radiation detection and analysis. The goal of DUNEEL is to prepare students for potential employment in the nuclear engineering arena.

Drexel VLSI Laboratory

The Drexel VLSI Laboratory (http://ece.drexel.edu/faculty/taskin/wiki/vlsilab/index.php/Main_Page) investigates problems in the design, analysis, optimization and manufacturing of high performance (low power, high throughput) integrated circuits in contemporary CMOS and emerging technologies. Suited with industrial design tools for integrated circuits, simulation tools and measurement beds, the VLSI group is involved

with digital and mixed-signal circuit design to verify the functionality of the discovered novel circuit and physical design principles. The Drexel VLSI laboratory develops design methodologies and automation tools in these areas, particularly in novel clocking techniques, featuring resonant clocking, and interconnects, featuring wireless interconnects.

Drexel Wireless Systems Laboratory

The Drexel Wireless Systems Laboratory (DWSL) contains an extensive suite of equipment for constructing, debugging, and testing prototype wireless communications systems. Major equipment within DWSL includes:

- three software defined radio network testbeds (HYDRA, USRP, and WARP) for rapidly prototyping radio, optical and ultrasonic communications systems,
- a TDK RF anechoic chamber and EMSCAN desktop antenna pattern measurement system,
- a materials printer and printed circuit board milling machine for fabricating conformal antennas and
- wireless protocol conformance testing equipment from Aeroflex.

The lab is also equipped with network analyzers, high speed signal generators, oscilloscopes, and spectrum analyzers as well as several Zigbee development platforms for rapidly prototyping sensor networks.

DWSL personnel also collaborate to create wearable, fabric based transceivers through collaboration with the Shima Seiki Haute Laboratory in the Drexel ExCITe Center. The knitting equipment at Drexel includes sixteen SDS-ONE APEX3 workstations and four state-of-the-art knitting machines. The workstations accurately simulate fabric construction and provide researchers and designers the opportunity to program, create and simulate textile prototypes, import CAD specifications of final products, and produce made-to-measure or mass-produced pieces on Shima Seiki knitting machines. For testing smart textiles for biomedical, DWSL personnel also have collaborators in the Center for Interdisciplinary Clinical Simulation and Practice (CICSP) in the Drexel College of Medicine which provides access to medical mannequin simulators.

Ecological and Evolutionary Signal-processing and Informatics Laboratory

The Ecological and Evolutionary Signal-processing and Informatics Laboratory (EESI) (http://www.ece.drexel.edu/gailr/EESI) seeks to solve problems in high-throughput genomics and engineer better solutions for biochemical applications. The lab's primary thrust is to enhance the use of high-throughput DNA sequencing technologies with pattern recognition and signal processing techniques. Applications include assessing the organism content of an environmental sample, recognizing/classifying potential and functional genes, inferring environmental factors and inter-species relationships, and inferring microbial evolutionary relationships from short-read DNA/RNA fragments. The lab also investigates higher-level biological systems such as modeling and controlling chemotaxis, the movement of cells.

Electric Power Engineering Center

This newly established facility makes possible state-of-the-art research in a wide variety of areas, ranging from detailed theoretical model study to experimental investigation in its high voltage laboratories. The mission is to advance and apply scientific and engineering knowledge associated with the generation, transmission, distribution, use, and conservation of electric power. In pursuing these goals, this center works with electric utilities, state and federal agencies, private industries,

nonprofit organizations and other universities on a wide spectrum of projects. Research efforts, both theoretical and experimental, focus on the solution of those problems currently faced by the electric power industry. Advanced concepts for electric power generation are also under investigation to ensure that electric power needs will be met at the present and in the future.

Electronic Design Automation Facility

Industrial-grade electronic design automation software suite and intergrated design environment for digital, analog and mixed-signal systems development. Field Programmable Gate Array (FPGA) development hardware. Most up-to-date FPGA/embedded system development hardware kits. Printed circuit board production facility. Also see Drexel VLSI Laboratory.

Microwave-Photonics Device Laboratories

The laboratory is equipped with test and measurement equipment for high-speed analog and digital electronics and fiber optic systems. The test equipment includes network analyzers from Agilent (100kHz- 1.3 GHz and 45 Mhz-40 GHz), and Anritsu (45 MHz-6 GHz); spectrum analyzers from Tektronix, HP, and Agilent with measurement capability of DC to 40 GHz and up to 90 GHz using external mixers; signal generators and communication channel modulators from HP, Rhode-Schwartz, Systron Donner, and Agilent; microwave power meter and sensor heads, assortment of passive and active microwave components up to 40 GHz ; data pattern generator and BER tester up to 3Gb/s; optical spectrum analyzer from Anritsu and power meters from HP; single and multimode fiber optic based optical transmitter and receiver boards covering ITU channels at data rates up to 10Gb/s; passive optical components such as isolator, filter, couplers, optical connectors and fusion splicer; LPKF milling machine for fabrication of printed circuit boards; wire-bonding and Cascade probe stations; Intercontinental test fixtures for testing of MMIC circuits and solid-state transistors; state-of-the-art microwave and electromagnetic CAD packages such as Agilent ADS, ANSYS HFSS, and COMSOL multi-physics module.

Music and Entertainment Technology Laboratory

The Music and Entertainment Technology Laboratory (MET-lab) is devoted to research in digital media technologies that will shape the future of entertainment, especially in the areas of sound and music. We employ digital signal processing and machine learning to pursue novel applications in music information retrieval, music production and processing technology, and new music interfaces. The MET-lab is also heavily involved in outreach programs for K-12 students and hosts the Summer Music Technology program, a one-week learning experience for high school students. Lab facilities include a sound isolation booth for audio and music recording, a digital audio workstation running ProTools, two large multi-touch display interfaces of our own design, and a small computing cluster for distributed processing.

NanoPhotonics+ Lab (http://drexelnanophotonics.com)

Our research is primarily in the area of nanophotonics with a focus on the nanoscale interaction of light with matter. Interests include: liquid crystal/polymer composites for gratings, lenses and HOEs; liquid crystal interactions with surfaces and in confined nanospaces; alternative energy generation through novel photon interactions; ink-jet printed conducting materials for RF and photonic applications; and the creation and development of smart textiles technologies including soft interconnects, sensors, and wireless implementations.

Opto-Electro-Mechanical Laboratory

This lab concentrates on the system integration on optics, electronics, and mechanical components and systems, for applications in imaging, communication, and biomedical research. Research areas include: Programmable Imaging with Optical Micro-electrical-mechanical systems (MEMS), in which microscopic mirrors are used to image light into a single photodetector; Pre-Cancerous Detection using White Light Spectroscopy, which performs a cellular size analysis of nuclei in tissue; Free-space Optical Communication using Space Time Coding, which consists of diffused light for computer-to-computer communications, and also tiny lasers and detectors for chip-to-chip communication; Magnetic Particle Locomotion, which showed that particles could swim in a uniform field; and Transparent Antennas using Polymer, which enables antennas to be printed through an ink-jet printer.

Plasma and Magnetics Laboratory

Research is focused on applications of electrical and magnetic technologies to biology and medicine. This includes the subjects of non-thermal atmospheric pressure plasma for medicine, magnetic manipulation of particles for drug delivery and bio-separation, development of miniature NMR sensors for cellular imaging and carbon nanotube cellular probes.

Power Electronics Research Laboratory

The Power Electronics Research Laboratory (PERL) is involved in circuit and design simulation, device modeling and simulation, and experimental testing and fabrication of power electronic circuits. The research and development activities include electrical terminations, power quality, solar photovoltaic systems, GTO modeling, protection and relay coordination, and solid-state circuit breakers. The analysis tools include EMPT, SPICE, and others, which have been modified to incorporate models of such controllable solid-state switches as SCRs, GTOs, and MOSFETs. These programs have a wide variety and range of modeling capabilities used to model electromagnetics and electromechanical transients ranging from microseconds to seconds in duration. The PERL is a fully equipped laboratory with 42 kVA AC and 70 kVA DC power sources and data acquisition systems, which have the ability to display and store data for detailed analysis. Some of the equipment available is a distribution and HV transformer and three phase rectifiers for power sources and digital oscilloscopes for data measuring and experimental analysis. Some of the recent studies performed by the PERL include static VAR compensators, power quality of motor controllers, solid-state circuit breakers, and power device modeling which have been supported by PECO, GE, Gould, and EPRI.

RE Touch Lab

The RE Touch Lab is investigating the perceptual and mechanical basis of active touch perception, or haptics, and the development of new technologies for stimulating the sense of touch, allowing people to touch, feel, and interact with digital content as seamlessly as we do with objects in the real world. We study the scientific foundations of haptic perception and action, and the neuroscientific and biomechanical basis of touch, with a long-term goal of uncovering the fundamental perceptual and mechanical computations that enable haptic interaction. We also create new technologies for rendering artificial touch sensations that simulate those that are experienced when interacting with real objects, inspired by new findings on haptic perception.

Testbed for Power-Performance Management of Enterprise Computing Systems

This computing testbed is used to validate techniques and algorithms aimed at managing the performance and power consumption of enterprise computing systems. The testbed comprises a rack of Dell 2950 and Dell 1950 PowerEdge servers, as well as assorted desktop machines, networked via a gigabit switch. Virtualization of this cluster is enabled by VMWare's ESX Server running the Linux RedHat kernel. It also comprises of a rack of ten Apple Xserve machines networked via a gigabit switch. These servers run the OS X Leopard operating systems and have access to a RAID with TBs of total disk capacity.

Interdepartmental Faculty

Kapil Dandekar, PhD *(University of Texas-Austin) Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean of Research, College of Engineering.* Professor. Cellular/mobile communications and wireless LAN; smart antenna/MIMO for wireless communications; applied computational electromagnetics; microwave antenna and receiver development; free space optical communication; ultrasonic communication; sensor networks for homeland security; ultrawideband communication.

Rachel Greenstadt, PhD *(Harvard University).* Assistant Professor. Artificial intelligence, privacy, security, multi-agent systems, economics of electronic privacy and information security.

Constantine Katsinis, PhD *(University of Rhode Island).* Associate Professor. High-performance computer networks, parallel computer architectures with sustained teraflops performance, computer security, image processing.

Steven Weber, PhD *(University of Texas-Austin) Assistant Department Head for Graduate Affairs, Electrical and Computer Engineering.* Associate Professor. Mathematical modeling of computer and communication networks, specifically streaming multimedia and ad hoc networks.

Christopher C. Yang, PhD *(University of Arizona, Tucson).* Associate Professor. Web search and mining, security informatics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, digital library, and electronic commerce.

Electrical Engineering

Major: Electrical Engineering
Degree Awarded: Master of Science (MS): or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 - 48.0 (MS) or 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.1001
Standard Occupational Classification (SOC) code: 17-2071

About the Program

The program in electrical engineering prepares students for careers in research and development, and aims to endow graduates with the ability to identify, analyze and address new technical and scientific challenges. At present, the department offers graduate coursework in six general areas: (1) computer engineering; (2) control, robotics and intelligent systems; (3) electrophysics; (4) image and signal

processing and interpretation; (5) power engineering and energy; and (6) telecommunications and networking.

The Master of Science in Electrical Engineering degree requires a minimum of 45.0 approved credits chosen in accordance with a plan of study arranged with the permission of a student's advisor and the departmental graduate advisor. Students who complete a six-month period of internship through Drexel's Graduate Co-op Program (GCP) (http://www.ece.drexel.edu/grad/cie.html) must complete 48.0 credits including 6.0 GCP credits.

The plan must contain a selection of core courses from the department's offerings and may include appropriate graduate courses from other engineering departments or from physics or mathematics. Further information can be obtained from the department office or from the graduate advisor.

All students also are encouraged to engage in thesis research. The combined thesis and research cannot exceed 9.0 credits. The program is organized so that a student may complete the degree requirements in two years of full-time study or three years of part-time study.

For more information about the programs, including information about teaching and research assistantships, visit the Department's Electrical and Computer Engineering (http://drexel.edu/engineering/departments/electrical_comp) web site.

Admission Requirements

Applicants must satisfy general requirements for graduate admission, including a minimum 3.0 GPA (on a 4.0 scale) for the last two years of undergraduate studies, as well as for any subsequent graduate work, and hold a bachelor's degree or the equivalent in electrical engineering, computer engineering, or the equivalent from an accredited college or university. A degree in science (physics, mathematics, computer science, etc.) is also acceptable. Applicants with degrees in sciences may be required to take a number of undergraduate engineering courses. An undergraduate degree earned abroad must be deemed equivalent to a US bachelor's.

Applicants for full-time MS and PhD programs must take the GRE general test. Students whose native language is not English and who do not hold a degree from a US institution must take the TOEFL within two years before application.

For additional information on how to apply, visit Drexel's Admissions page for Electrical Engineering (http://www.drexel.edu/grad/programs/coe/electrical-engineering).

Master of Science in Electrical Engineering

The Master of Science in Electrical Engineering curriculum encompasses 45.0 or 48.0 (with the Graduate Co-op option) approved credit hours, chosen in accordance with the following requirements and a plan of study arranged with the departmental graduate advisor in consultation with the student's research advisor, if applicable. Before the end of the first quarter in the Department of Electrical and Computer Engineering, for a full-time student, or by the end of the first year for a part-time student, said plan of study must be filed and approved with the departmental graduate advisor.

A total of at least 30.0 credit hours must be taken from among the graduate course offerings of the Department of Electrical and Computer Engineering. These credits must be taken at Drexel University. No

transfer credit may be used to fulfill these requirements, regardless of content equivalency.

The remaining courses needed to reach the minimum credit hour requirement for the degree program are considered elective courses. Elective courses can be chosen from among the graduate course offerings of the Department of Electrical and Computer Engineering; other departments within the College of Engineering; the School of Biomedical Science, Engineering and Health Systems; the Department of Mathematics; the Department of Physics; the Department of Chemistry and the Department of Biology. In order to have courses outside of these departments and schools count towards degree completion, they must be approved by the departmental graduate advisors prior to registration for said courses.

Please note that ECEC 500 (Fundamentals of Computer Hardware) and ECEC 600 (Fundamentals of Computer Networks) do **not** count toward the credit requirements to complete the MS in Electrical Engineering degree program.

Customizable Specialization

Required Courses	
Electrical Engineering (ECEE, ECEP, ECES, ECET) Courses	21.0
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses	9.0
Elective Courses	15.0
Total Credits	**45.0**

Electrophysics Specialization

Required Courses	
Electrophysics (ECEE) Courses	18.0
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses	12.0
Elective Courses	15.0
Total Credits	**45.0**

Controls, Robotics, Intelligent Systems Specialization

Required Courses		
ECES 511	Fundamentals of Systems I	3.0
ECES 512	Fundamentals of Systems II	3.0
ECES 521	Probability & Random Variables	3.0
ECES 522	Random Process & Spectral Analysis	3.0
Select three of the following:		9.0
ECES 604	Optimal Estimation & Stochastic Control	
ECES 642	Optimal Control	
ECES 644	Computer Control Systems	
ECES 651	Intelligent Control	
ECES 817	Non-Linear Control Systems	
ECES 818	Machine Learning & Adaptive Control	
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses		9.0
Elective Courses		15.0
Total Credits		**45.0**

Power Engineering Specialization

Required Courses		
ECEP 501	Power System Analysis	3.0

ECEP 502	Computer Analysis of Power Systems	3.0
ECEP 503	Synchronous Machine Modeling	3.0
Select one of the following sequences:		6.0
ECES 511 & ECES 512	Fundamentals of Systems I and Fundamentals of Systems II	
ECES 521 & ECES 522	Probability & Random Variables and Random Process & Spectral Analysis	
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses		15.0
Elective Courses		15.0
Total Credits		**45.0**

Signal/Image Processing Specialization

Required Courses		
ECES 521	Probability & Random Variables	3.0
ECES 522	Random Process & Spectral Analysis	3.0
ECES 523	Detection & Estimation Theory	3.0
ECES 631	Fundamentals of Deterministic Digital Signal Processing	3.0
ECES 682	Fundamentals of Image Processing	3.0
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses		15.0
Elective Courses		15.0
Total Credits		**45.0**

Options for Degree Fulfillment

Although not required, students are encouraged to complete a Master's Thesis as part of the MS studies. Those students who choose the thesis option may count up to 9.0 research/thesis credits as part of their required credit hour requirements.

Students may choose to participate in the Graduate Co-Op Program, where 6.0 credit hours can be earned for a six month cooperative education experience in industry, working on curriculum related projects. The total number of required credit hours is increased to 48.0 for those students who choose to pursue the Graduate Co-op option. This change represents an increase in non-departmental required credit hours to a total of 18.0 credit hours, 6.0 of which are earned from the cooperative education experience.

For more information on curricular requirements, visit the Department of Electrical and Computer Engineering' (http://www.ece.drexel.edu)s web site.

PhD in Electrical Engineering

General Requirements
The following general requirements must be satisfied in order to complete the PhD in Electrical Engineering:

- 90.0 credit hours total
- candidacy examination
- research proposal
- dissertation defense

Students entering with a master's degree in electrical or computer engineering or a related field will be considered a post-masters PhD

student and will only be required to complete a total of 45.0 credit hours, in accordance with University policy.

Curriculum
Appropriate coursework is chosen in consultation with the student's research advisor. A plan of study must be developed by the student to encompass the total number of required credit hours. Both the departmental graduate advisor and the student's research advisor must approve this plan.

Candidacy Examination
The candidacy examination explores the depth of understanding of the student in his/her specialty area. The student is expected to be familiar with, and be able to use, the contemporary tools and techniques of the field and to demonstrate familiarity with the principal results and key findings.

The student, in consultation with his/her research advisor, will declare a principal technical area for the examination. The examination includes the following three parts:

- A self-study of three papers from the archival literature in the student's stated technical area, chosen by the committee in consultation with the student.
- A written report (15 pages or less) on the papers, describing their objectives, key questions and hypotheses, methodology, main results and conclusions. Moreover, the student must show in an appendix independent work he/she has done on at least one of the papers – such as providing a full derivation of a result or showing meaningful examples, simulations or applications.
- An oral examination which takes the following format:
  - A short description of the student's principal area of interest (5 minutes, by student).
  - A review of the self-study papers and report appendix (25-30 minutes, by student).
  - Questions and answers on the report, the appendix and directly related background (40-100 minutes, student and committee).

In most cases, the work produced during the candidacy examination will be a principal reference for the student's PhD dissertation; however, this is not a requirement.

Research Proposal
After having attained the status of PhD Candidate, each student must present a research proposal to a committee of faculty and industry members, chosen with his/her research advisor, who are knowledgeable in the specific area of research. This proposal should outline the specific intended subject of study, i.e., it should present a problem statement, pertinent background, methods of study to be employed, expected difficulties and uncertainties and the anticipated form, substance and significance of the results.

The purpose of this presentation is to verify suitability of the dissertation topic and the candidate's approach, and to obtain the advice and guidance of oversight of mature, experienced investigators. It is not to be construed as an examination, though approval by the committee is required before extensive work is undertaken. The thesis proposal presentation must be open to all; announcements regarding the proposal presentation must be made in advance.

The thesis advisory committee will have the sole responsibility of making any recommendations regarding the research proposal. It is strongly

recommended that the proposal presentation be given as soon as possible after the successful completion of the candidacy examination.

Dissertation Defense

Dissertation Defense procedures are described in the Graduate College of Drexel University (http://www.drexel.edu/graduatecollege) policies regarding Doctor of Philosophy Program Requirements. The student must be a PhD candidate for at least one year before he/she can defend his/her doctoral thesis.

Dual Degree

The Department of Electrical and Computer Engineering offers outstanding students the opportunity to receive two diplomas (BS and MS) at the same time. The program requires five (5) years to complete. Participants, who are chosen from the best undergraduates students, work with a faculty member on a research project and follow a study plan that includes selected graduate classes. This program prepares individuals for careers in research and development; many of its past graduates continued their studies toward a PhD.

For more information on eligibility, academic requirements, and tuition policy visit the Engineering Combined BS/MS (http://www.ece.drexel.edu/undergrad/bsms.html) page.

Facilities

Drexel University and the Electrical and Computer Engineering Department are nationally recognized for a strong history of developing innovative research. Research programs in the ECE Department prepare students for careers in research and development, and aim to endow graduates with the ability to identify, analyze, and address new technical and scientific challenges. The ECE Department is well equipped with state-of-the-art facilities in each of the following ECE Research laboratories:

Research Laboratories at the ECE Department

Adaptive Signal Processing and Information Theory Research Group

The Adaptive Signal Processing and Information Theory Research Group (http://www.ece.drexel.edu/walsh/aspitrg/home.html) conducts research in the area of signal processing and information theory. Our main interests are belief/expectation propagation, turbo decoding and composite adaptive system theory. We are currently doing projects on the following topics:
i) Delay mitigating codes for network coded systems,
ii) Distributed estimation in sensor networks via expectation propagation,
iii) Turbo speaker identification,
iv) Performance and convergence of expectation propagation,
v) Investigating bounds for SINR performance of autocorrelation based channel shorteners.

Applied Networking Research Lab

Applied Networking Research Lab (ANRL) projects focus on modeling and simulation as well as experimentation in wired, wireless and sensor networks. ANRL is the home of MuTANT, a Multi-Protocol Label Switched Traffic Engineering and Analysis Testbed composed of 10 high-end Cisco routers and several PC-routers, also used to study other protocols in data networks as well as automated network configuration and management. The lab also houses a sensor network testbed.

Bioimage Laboratory

Uses computer gaming hardware for enhanced and affordable 3-D visualization, along with techniques from information theory and machine learning to combine the exquisite capabilities of the human visual system with computational sensing techniques for analyzing vast quantities of image sequence data.

Data Fusion Laboratory

The Data Fusion Laboratory investigates problems in multisensory detection and estimation, with applications in robotics, digital communications, radar, and target tracking. Among the projects in progress: computationally efficient parallel distributed detection architectures, data fusion for robot navigation, modulation recognition and RF scene analysis in time-varying environments, pattern recognition in biological data sequences and large arrays, and hardware realizations of data fusion architectures for target detection and target tracking.

Drexel Network Modeling Laboratory

The Drexel Network Modeling Laboratory investigates problems in the mathematical modeling of communication networks, with specific focus on wireless ad hoc networks, wireless sensor networks, and supporting guaranteed delivery service models on best effort and multipath routed networks. Typical methodologies employed in our research include mathematical modeling, computer simulation, and performance optimization, often with the end goal of obtaining meaningful insights into network design principles and fundamental performance tradeoffs.

Drexel Power-Aware Computing Laboratory

The Power-Aware Computing Lab (http://dpac.ece.drexel.edu) investigates methods to increase energy efficiency across the boundaries of circuits, architecture, and systems. Our recent accomplishments include the Sigil profiling tool, scalable modeling infrastructure for accelerator implementations, microarchitecture-aware VDD gating algorithms, an accelerator architecture for ultrasound imaging, evaluation of hardware reference counting, hardware and operating system support for power-agile computing, and memory systems for accelerator-based architectures.

Drexel University Nuclear Engineering Education Laboratory

The field of nuclear engineering encompasses a wide spectrum of occupations, including nuclear reactor design, medical imaging, homeland security, and oil exploration. The Drexel University Nuclear Engineering Education Laboratory (DUNEEL) provides fundamental hands on understanding for power plant design and radiation detection and analysis. Software based study for power plant design, as well as physical laboratory equipment for radiation detection, strengthen the underlying concepts used in nuclear engineering such that the student will comprehend and appreciate the basic concepts and terminology used in various nuclear engineering professions. Additionally, students use the laboratory to develop methods for delivering remote, live time radiation detection and analysis. The goal of DUNEEL is to prepare students for potential employment in the nuclear engineering arena.

Drexel VLSI Laboratory

The Drexel VLSI Laboratory (http://ece.drexel.edu/faculty/taskin/wiki/vlsilab/index.php/Main_Page) investigates problems in the design, analysis, optimization and manufacturing of high performance (low power, high throughput) integrated circuits in contemporary CMOS and emerging technologies. Suited with industrial design tools for integrated circuits, simulation tools and measurement beds, the VLSI group is involved with digital and mixed-signal circuit design to verify the functionality of the discovered novel circuit and physical design principles. The Drexel VLSI laboratory develops design methodologies and automation tools in these areas, particularly in novel clocking techniques, featuring resonant clocking, and interconnects, featuring wireless interconnects.

Drexel Wireless Systems Laboratory

The Drexel Wireless Systems Laboratory (DWSL) contains an extensive suite of equipment for constructing, debugging, and testing prototype wireless communications systems. Major equipment within DWSL includes:

- three software defined radio network testbeds (HYDRA, USRP, and WARP) for rapidly prototyping radio, optical and ultrasonic communications systems,
- a TDK RF anechoic chamber and EMSCAN desktop antenna pattern measurement system,
- a materials printer and printed circuit board milling machine for fabricating conformal antennas and
- wireless protocol conformance testing equipment from Aeroflex.

The lab is also equipped with network analyzers, high speed signal generators, oscilloscopes, and spectrum analyzers as well as several Zigbee development platforms for rapidly prototyping sensor networks.

DWSL personnel also collaborate to create wearable, fabric based transceivers through collaboration with the Shima Seiki Haute Laboratory in the Drexel ExCITe Center. The knitting equipment at Drexel includes sixteen SDS-ONE APEX3 workstations and four state-of-the-art knitting machines. The workstations accurately simulate fabric construction and provide researchers and designers the opportunity to program, create and simulate textile prototypes, import CAD specifications of final products, and produce made-to-measure or mass-produced pieces on Shima Seiki knitting machines. For testing smart textiles for biomedical, DWSL personnel also have collaborators in the Center for Interdisciplinary Clinical Simulation and Practice (CICSP) in the Drexel College of Medicine which provides access to medical mannequin simulators.

Ecological and Evolutionary Signal-processing and Informatics Laboratory

The Ecological and Evolutionary Signal-processing and Informatics Laboratory (EESI) (http://www.ece.drexel.edu/gailr/EESI) seeks to solve problems in high-throughput genomics and engineer better solutions for biochemical applications. The lab's primary thrust is to enhance the use of high-throughput DNA sequencing technologies with pattern recognition and signal processing techniques. Applications include assessing the organism content of an environmental sample, recognizing/classifying potential and functional genes, inferring environmental factors and inter-species relationships, and inferring microbial evolutionary relationships from short-read DNA/RNA fragments. The lab also investigates higher-level biological systems such as modeling and controlling chemotaxis, the movement of cells.

Electric Power Engineering Center

This newly established facility makes possible state-of-the-art research in a wide variety of areas, ranging from detailed theoretical model study to experimental investigation in its high voltage laboratories. The mission is to advance and apply scientific and engineering knowledge associated with the generation, transmission, distribution, use, and conservation of electric power. In pursuing these goals, this center works with electric utilities, state and federal agencies, private industries, nonprofit organizations and other universities on a wide spectrum of projects. Research efforts, both theoretical and experimental, focus on the solution of those problems currently faced by the electric power industry. Advanced concepts for electric power generation are also under investigation to ensure that electric power needs will be met at the present and in the future.

Electronic Design Automation Facility

Industrial-grade electronic design automation software suite and intergrated design environment for digital, analog and mixed-signal systems development. Field Programmable Gate Array (FPGA) development hardware. Most up-to-date FPGA/embedded system development hardware kits. Printed circuit board production facility. Also see Drexel VLSI Laboratory.

Microwave-Photonics Device Laboratories

The laboratory is equipped with test and measurement equipment for high-speed analog and digital electronics and fiber optic systems. The test equipment includes network analyzers from Agilent (100kHz- 1.3 GHz and 45 Mhz-40 GHz), and Anritsu (45 MHz-6 GHz); spectrum analyzers from Tektronix, HP, and Agilent with measurement capability of DC to 40 GHz and up to 90 GHz using external mixers; signal generators and communication channel modulators from HP, Rhode-Schwartz, Systron Donner, and Agilent; microwave power meter and sensor heads, assortment of passive and active microwave components up to 40 GHz ; data pattern generator and BER tester up to 3Gb/s; optical spectrum analyzer from Anritsu and power meters from HP; single and multimode fiber optic based optical transmitter and receiver boards covering ITU channels at data rates up to 10Gb/s; passive optical components such as isolator, filter, couplers, optical connectors and fusion splicer; LPKF milling machine for fabrication of printed circuit boards; wire-bonding and Cascade probe stations; Intercontinental test fixtures for testing of MMIC circuits and solid-state transistors; state-of-the-art microwave and electromagnetic CAD packages such as Agilent ADS, ANSYS HFSS, and COMSOL multi-physics module.

Music and Entertainment Technology Laboratory

The Music and Entertainment Technology Laboratory (MET-lab) is devoted to research in digital media technologies that will shape the future of entertainment, especially in the areas of sound and music. We employ digital signal processing and machine learning to pursue novel applications in music information retrieval, music production and processing technology, and new music interfaces. The MET-lab is also heavily involved in outreach programs for K-12 students and hosts the Summer Music Technology program, a one-week learning experience for high school students. Lab facilities include a sound isolation booth for audio and music recording, a digital audio workstation running ProTools,

two large multi-touch display interfaces of our own design, and a small computing cluster for distributed processing.

NanoPhotonics+ Lab (http://drexelnanophotonics.com)

Our research is primarily in the area of nanophotonics with a focus on the nanoscale interaction of light with matter. Interests include: liquid crystal/polymer composites for gratings, lenses and HOEs; liquid crystal interactions with surfaces and in confined nanospaces; alternative energy generation through novel photon interactions; ink-jet printed conducting materials for RF and photonic applications; and the creation and development of smart textiles technologies including soft interconnects, sensors, and wireless implementations.

Opto-Electro-Mechanical Laboratory

This lab concentrates on the system integration on optics, electronics, and mechanical components and systems, for applications in imaging, communication, and biomedical research. Research areas include: Programmable Imaging with Optical Micro-electrical-mechanical systems (MEMS), in which microscopic mirrors are used to image light into a single photodetector; Pre-Cancerous Detection using White Light Spectroscopy, which performs a cellular size analysis of nuclei in tissue; Free-space Optical Communication using Space Time Coding, which consists of diffused light for computer-to-computer communications, and also tiny lasers and detectors for chip-to-chip communication; Magnetic Particle Locomotion, which showed that particles could swim in a uniform field; and Transparent Antennas using Polymer, which enables antennas to be printed through an ink-jet printer.

Plasma and Magnetics Laboratory

Research is focused on applications of electrical and magnetic technologies to biology and medicine. This includes the subjects of non-thermal atmospheric pressure plasma for medicine, magnetic manipulation of particles for drug delivery and bio-separation, development of miniature NMR sensors for cellular imaging and carbon nanotube cellular probes.

Power Electronics Research Laboratory

The Power Electronics Research Laboratory (PERL) is involved in circuit and design simulation, device modeling and simulation, and experimental testing and fabrication of power electronic circuits. The research and development activities include electrical terminations, power quality, solar photovoltaic systems, GTO modeling, protection and relay coordination, and solid-state circuit breakers. The analysis tools include EMPT, SPICE, and others, which have been modified to incorporate models of such controllable solid-state switches as SCRs, GTOs, and MOSFETs. These programs have a wide variety and range of modeling capabilities used to model electromagnetics and electromechanical transients ranging from microseconds to seconds in duration. The PERL is a fully equipped laboratory with 42 kVA AC and 70 kVA DC power sources and data acquisition systems, which have the ability to display and store data for detailed analysis. Some of the equipment available is a distribution and HV transformer and three phase rectifiers for power sources and digital oscilloscopes for data measuring and experimental analysis. Some of the recent studies performed by the PERL include static VAR compensators, power quality of motor controllers, solid-state circuit breakers, and power

device modeling which have been supported by PECO, GE, Gould, and EPRI.

RE Touch Lab

The RE Touch Lab is investigating the perceptual and mechanical basis of active touch perception, or haptics, and the development of new technologies for stimulating the sense of touch, allowing people to touch, feel, and interact with digital content as seamlessly as we do with objects in the real world. We study the scientific foundations of haptic perception and action, and the neuroscientific and biomechanical basis of touch, with a long-term goal of uncovering the fundamental perceptual and mechanical computations that enable haptic interaction. We also create new technologies for rendering artificial touch sensations that simulate those that are experienced when interacting with real objects, inspired by new findings on haptic perception.

Testbed for Power-Performance Management of Enterprise Computing Systems

This computing testbed is used to validate techniques and algorithms aimed at managing the performance and power consumption of enterprise computing systems. The testbed comprises a rack of Dell 2950 and Dell 1950 PowerEdge servers, as well as assorted desktop machines, networked via a gigabit switch. Virtualization of this cluster is enabled by VMWare's ESX Server running the Linux RedHat kernel. It also comprises of a rack of ten Apple Xserve machines networked via a gigabit switch. These servers run the OS X Leopard operating systems and have access to a RAID with TBs of total disk capacity.

Electrical and Computer Engineering Faculty

Fernand Cohen, PhD *(Brown University)*. Professor. Surface modeling; tissue characterization and modeling; face modeling; recognition and tracking.

Kapil Dandekar, PhD *(University of Texas-Austin) Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean of Research, College of Engineering.* Professor. Cellular/mobile communications and wireless LAN; smart antenna/MIMO for wireless communications; applied computational electromagnetics; microwave antenna and receiver development; free space optical communication; ultrasonic communication; sensor networks for homeland security; ultrawideband communication.

Afshin Daryoush, ScD *(Drexel University)*. Professor. Digital and microwave photonics; nonlinear microwave circuits; RFIC; medical imaging.

Bruce A. Eisenstein, PhD *(University of Pennsylvania) Interim Dean, College of Engineering.* Professor. Pattern recognition; estimation; decision theory.

Adam K. Fontecchio, PhD *(Brown University) Electrical and Computer Engineering.* Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Gary Friedman, PhD *(University of Maryland-College Park).* Professor. Biological and biomedical applications of nanoscale magnetic systems.

Eli Fromm, PhD *(Jefferson Medical College) Roy A. Brothers University Professor / Director for Center of Educational Research.* Professor.

Engineering education; academic research policy; bioinstrumentation; physiologic systems.

Edwin L. Gerber, PhD *(University of Pennsylvania) Assistant Department Head for Evening Programs.* Professor. Computerized instruments and measurements; undergraduate engineering education.

Allon Guez, PhD *(University of Florida).* Professor. Intelligent control systems; robotics, biomedical, automation and manufacturing; business systems engineering.

Mark Hempstead, PhD *(Harvard University) Junior Colehower Chair.* Assistant Professor. Computer engineering; power-aware computing; computer architecture; low power VLSI Design; wireless sensor networks.

Peter R. Herczfeld, PhD *(University of Minnesota) Lester A. Kraus Professor/Director, Center for Microwave/Lightwave Engineering.* Professor. Lightwave technology; microwaves; millimeter waves; fiberoptic and integrated optic devices.

Leonid Hrebien, PhD *(Drexel University) Graduate Advisor and Assistant Department Head for Graduate Affairs.* Professor. Tissue excitability; acceleration effects on physiology; bioinformatics.

Paul R. Kalata, PhD *(Illinois Institute of Technology).* Associate Professor. Stochastic and adaptive control theory; identification and decision theory; Kalman filters.

Moshe Kam, PhD *(Drexel University) Robert G. Quinn Professor of Electrical and Computer Engineering and Department Head.* Professor. Decision fusion and sensor fusion; mobile robots (especially robot navigation); pattern recognition (especially in handwriting applications); optimization and control.

Nagarajan Kandasamy, PhD *(University of Michigan).* Associate Professor. Embedded systems, self-managing systems, reliable and fault-tolerant computing, distributed systems, computer architecture, and testing and verification of digital systems.

Bruce Katz, PhD *(University of Illinois).* Adjunct Professor. Speech communication and computer science; artificial intelligence.

Youngmoo Kim, PhD *(MIT).* Associate Professor. Audio and music signal processing, voice analysis and synthesis, music information retrieval, machine learning.

Timothy P. Kurzweg, PhD *(University of Pittsburgh).* Associate Professor. Optical MEM modeling and simulation; system-level simulation; computer architecture.

Karen Miu, PhD *(Cornell University).* Professor. Power systems; distribution networks; distribution automation; optimization; system analysis.

Bahram Nabet, PhD *(University of Washington) Associate Dean for Special Projects, College of Engineering; Electrical and Computer Engineering.* Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Prawat Nagvajara, Ph.D. *(Boston University).* Associate Professor. System on a chip; embedded systems; power grid computation; testing of computer hardware; fault-tolerant computing; VLSI systems; error control coding.

Dagmar Niebur, Ph.D. *(Swiss Federal Institute of Technology).* Associate Professor. Intelligent systems; dynamical systems; power system monitoring and control.

Chika Nwankpa, PhD *(Illinois Institute of Technology).* Professor. Power system dynamics; power electronic switching systems; optically controlled high power switches.

Karkal S. Prahbu, PhD *(Harvard University).* Auxiliary Professor. Computer and software engineering; advanced microprocessors and distributed operating systems.

Gail L. Rosen, PhD *(Georgia Institute of Technology).* Associate Professor. Signal processing, signal processing for biological analysis and modeling, bio-inspired designs, source localization and tracking.

Kevin J. Scoles, PhD *(Dartmouth College) Associate Dean, College of Engineering, Office of Student Services.* Associate Professor. Microelectronics; electric vehicles; solar energy; biomedical electronics.

Harish Sethu, PhD *(Lehigh University).* Associate Professor. Protocols, architectures and algorithms in computer networks; computer security; mobile ad hoc networks; large-scale complex adaptive networks and systems.

P. Mohana Shankar, PhD *(Indian Institute of Technology) Allen Rothwarf Professor of Electrical and Computer Engineering.* Professor. Wireless communications; biomedical ultrasonics; fiberoptic bio-sensors.

Baris Taskin, PhD *(University of Pittsburgh).* Associate Professor. Electronic design automation (EDA) of integrated circuits, high-performance VLSI circuits and systems, sequential circuit timing and synchronization, system-on-chip (SOC) design, operational research, VLSI computer-aided design.

Lazar Trachtenberg, DSc *(Israel Institute of Technology).* Professor. Fault tolerance; multi-level logic synthesis; signal processing; suboptimal filtering.

Oleh Tretiak, ScD *(MIT) Robert C. Disque Professor of Electrical and Computer Engineering.* Professor. Image processing; tomography; image registration; pattern recognition.

John MacLaren Walsh, PhD *(Cornell University).* Assistant Professor. Performance and convergence of belief/expectation propagation and turbo decoding/equalization/synchronization, permeation models for ion channels, composite adaptive systems theory.

Steven Weber, PhD *(University of Texas-Austin) Assistant Department Head for Graduate Affairs, Electrical and Computer Engineering.* Associate Professor. Mathematical modeling of computer and communication networks, specifically streaming multimedia and ad hoc networks.

Jaudelice Cavalcante de Oliveira, PhD *(Georgia Institute of Technology).* Associate Professor. Next generation Internet; quality of service in computer communication networks; wireless networks.

Interdepartmental Faculty

Dov Jaron, PhD *(University of Pennsylvania) Calhoun Distinguished Professor of Engineering in Medicine.* Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Jeremy R. Johnson, PhD *(Ohio State University)*. Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

John Lacontora, PhD *(New Jersey Institute of Technology)*. Associate Research Professor. Service engineering; industrial engineering.

Ryszard Lec, PhD *(University of Warsaw Engineering College)*. Professor. Biomedical applications of visoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Spiros Mancoridis, PhD *(University of Toronto) Interim Department Head, Computer Science*. Professor. Software engineering; software security; code analysis; evolutionary computation.

Karen Moxon, PhD *(University of Colorado)*. Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Paul Y. Oh, PhD *(Columbia University) Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics*. Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Banu Onaral, Ph.D. *(University of Pennsylvania) H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD *(Rensselaer Polytechnic University)*. Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

William C. Regli, PhD *(University of Maryland-College Park)*. Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Arye Rosen, PhD *(Drexel University) Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Jonathan E. Spanier, PhD *(Columbia University) Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Aydin Tozeren, PhD *(Columbia University) Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Aspasia Zerva, PhD *(University of Illinois)*. Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Emeritus Faculty

Richard L. Coren, PhD *(Polytechnic Institute of Brooklyn)*. Professor Emeritus. Electromagnetic fields, antennas, shielding, RFI, cybernetics of evolving systems.

Robert Fischl, PhD *(University of Michigan) John Jarem Professor Emeritus / Director, Center for Electric Power Engineering*. Professor Emeritus. Power: systems, networks, controls, computer-aided design, power systems, solar energy.

Vernon L. Newhouse, PhD *(University of Leeds) Disque Professor Emeritus*. Professor Emeritus. Biomedical and electrophysics: ultrasonic flow measurement, imaging and texture analysis in medicine, ultrasonic nondestructive testing and robot sensing, clinical engineering.

Hun H. Sun, PhD *(Cornell University) Ernest O. Lange Professor Emeritus*. Professor Emeritus. Systems and signals in biomedical control systems.

Electrical Engineering/ Telecommunications Engineering

Major: Electrical/Telecommunications Engineering
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 - 48.0 (MS) or 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.1001; 14.1004
Standard Occupational Classification (SOC) code: 15-1143; 17-2071

About the Program

Fueled by the rapid spread of technologies such as electronic mail, cellular and mobile phone systems, interactive cable television, and the information superhighway, Drexel's program in Telecommunications Engineering responds to the growing demand for engineers with telecommunications expertise. The program combines a strong foundation in telecommunications engineering with training in other important issues such as global concerns, business, and information transfer and processing.

Drexel University's program in Telecommunications Engineering combines the expertise of its faculty in electrical and computer engineering, business, information systems, and humanities. Through its interdisciplinary approach, Drexel's Telecommunications Engineering program trains and nurtures the complete telecommunications engineer.

The MS in Electrical Engineering/Telecommunications Engineering degree is awarded to students who demonstrate in-depth knowledge of the field. The average time required to complete the master's degree is two year of full-time or three years of part-time study.

For more information, visit the Department of Electrical and Computer Engineering' (http://www.ece.drexel.edu)s web site.

Admission Requirements

Applicants must meet the general requirements for graduate admission, which include at least a 3.0 GPA for the last two years of undergraduate study and for any graduate level study undertaken, and are required to hold a bachelor of science degree in electrical engineering or a related field. Applicants whose undergraduate degrees are not in the field of electrical engineering may be required to take a number of undergraduate courses. The GRE General Test is required of applicants for full-time MS and PhD programs. Applicants whose native language is not English and who do not have a previous degree from a US institution are required to take the Test of English as a Foreign Language (TOEFL).

For additional information on how to apply, visit Drexel's Admissions page for Electrical-Telecommunications Engineering (http://www.drexel.edu/grad/programs/coe/electrical-telecommunications).

MS in Electrical and Telecommunications Engineering

The Master of Science in Electrical and Telecommunications Engineering curriculum encompasses 45.0 or 48.0 (with the Graduate Co-Op) approved credit hours, chosen in accordance with the following requirements and a plan of study arranged with the departmental graduate advisor in consultation with the student's research advisor (if applicable). This plan of study must be filed in the Department of Electrical and Computer Engineering and approved with the departmental graduate advisor before the end of the first quarter for a full-time student, or by the end of the first year for a part-time student.

Degree Requirements

A total of at least 30.0 credit hours must be taken from among the graduate course offerings of the Department of Electrical and Computer Engineering. These credits must be taken at Drexel University. No transfer credit may be used to fulfill these requirements, regardless of content equivalency.

Telecommunications Engineering (ECET) Courses	6.0
Telecommunications Engineering Elective (ECEC, ECEE, ECES, ECET) Courses	15.0
General Electrical and Computer Engineering (ECEC, ECEE, ECEP, ECES, ECET) Courses	9.0
Elective Courses	15.0
Total Credits	**45.0**

With the remaining required 15.0 credit hours, students may take graduate coursework, subject to the approval of the departmental graduate advisor, in electrical and computer engineering, mathematics, physics or other engineering disciplines.

In addition, students pursuing an MS in Electrical and Telecommunications Engineering are allowed and strongly encouraged to take the following course as part of their required 15.0 credit hours:

- COM 650 Telecommunications Policy in the Information Age

Although not required, students are encouraged to complete a master's thesis as part of the MS studies. Those students who choose the thesis option may count up to 9.0 research/thesis credits as part of their required credit hour requirements.

Graduate Co-Op Program

Students may choose to participate in the Graduate Co-Op Program, where 6.0 credit hours can be earned for a six month cooperative education experience in industry, working on curriculum related projects. The total number of required credit hours is increased to 48 for those students who choose to pursue the Graduate Co-Op option. This change represents an increase in non-departmental required credit hours to a total of 18.0 credit hours, 6.0 of which are earned from the cooperative education experience.

Please note that ECEC 500 (Fundamentals of Computer Hardware) and ECEC 600 (Fundamentals of Computer Networks) do **not** count toward the credit requirements to complete the MS in Electrical Engineering degree program.

For more information on curricular requirements, visit the Department of Electrical and Computer Engineering (http://www.ece.drexel.edu)'s web site.

PhD in Electrical Engineering

General Requirements

The following general requirements must be satisfied in order to complete the PhD in Electrical Engineering:

- 90.0 credit hours total
- candidacy examination
- research proposal
- dissertation defense

Students entering with a master's degree in electrical or computer engineering or a related field will be considered a post-masters PhD student and will only be required to complete a total of 45.0 credit hours, in accordance with University policy.

Curriculum

Appropriate coursework is chosen in consultation with the student's research advisor. A plan of study must be developed by the student to encompass the total number of required credit hours. Both the departmental graduate advisor and the student's research advisor must approve this plan.

Candidacy Examination

The candidacy examination explores the depth of understanding of the student in his/her specialty area. The student is expected to be familiar with, and be able to use, the contemporary tools and techniques of the field and to demonstrate familiarity with the principal results and key findings.

The student, in consultation with his/her research advisor, will declare a principal technical area for the examination. The examination includes the following three parts:

- A self-study of three papers from the archival literature in the student's stated technical area, chosen by the committee in consultation with the student.
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- An oral examination which takes the following format:
  - A short description of the student's principal area of interest (5 minutes, by student).
  - A review of the self-study papers and report appendix (25-30 minutes, by student).
  - Questions and answers on the report, the appendix and directly related background (40-100 minutes, student and committee).

In most cases, the work produced during the candidacy examination will be a principal reference for the student's PhD dissertation; however, this is not a requirement.

Research Proposal

After having attained the status of PhD Candidate, each student must present a research proposal to a committee of faculty and industry members, chosen with his/her research advisor, who are knowledgeable in the specific area of research. This proposal should outline the specific intended subject of study, i.e., it should present a problem statement, pertinent background, methods of study to be employed, expected

difficulties and uncertainties and the anticipated form, substance and significance of the results.

The purpose of this presentation is to verify suitability of the dissertation topic and the candidate's approach, and to obtain the advice and guidance of oversight of mature, experienced investigators. It is not to be construed as an examination, though approval by the committee is required before extensive work is undertaken. The thesis proposal presentation must be open to all; announcements regarding the proposal presentation must be made in advance.

The thesis advisory committee will have the sole responsibility of making any recommendations regarding the research proposal. It is strongly recommended that the proposal presentation be given as soon as possible after the successful completion of the candidacy examination. The student must be a PhD candidate for at least one year before he/she can defend his/her doctoral thesis.

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Dual Degree

The ECE Department offers outstanding students the opportunity to receive two diplomas (BS and MS) at the same time. The program requires five (5) years to complete. Participants, who are chosen from the best undergraduates students, work with a faculty member on a research project and follow a study plan that includes selected graduate classes. This program prepares individuals for careers in research and development; many of its past graduates continued their studies toward a PhD.

For more information on eligibility, academic requirements, and tuition policy visit the Engineering Combined BS/MS (http://www.ece.drexel.edu/undergrad/bsms.html) page.

Facilities

Drexel University and the Electrical and Computer Engineering Department are nationally recognized for a strong history of developing innovative research. Research programs in the ECE Department prepare students for careers in research and development, and aim to endow graduates with the ability to identify, analyze, and address new technical and scientific challenges. The ECE Department is well equipped with state-of-the-art facilities in each of the following ECE Research laboratories:

Research Laboratories at the ECE Department

Adaptive Signal Processing and Information Theory Research Group

The Adaptive Signal Processing and Information Theory Research Group (http://www.ece.drexel.edu/walsh/aspitrg/home.html) conducts research in the area of signal processing and information theory. Our main interests are belief/expectation propagation, turbo decoding and composite adaptive system theory. We are currently doing projects on the following topics:

i) Delay mitigating codes for network coded systems,

ii) Distributed estimation in sensor networks via expectation propagation,

iii) Turbo speaker identification,

iv) Performance and convergence of expectation propagation,

v) Investigating bounds for SINR performance of autocorrelation based channel shorteners.

Applied Networking Research Lab

Applied Networking Research Lab (ANRL) projects focus on modeling and simulation as well as experimentation in wired, wireless and sensor networks. ANRL is the home of MuTANT, a Multi-Protocol Label Switched Traffic Engineering and Analysis Testbed composed of 10 high-end Cisco routers and several PC-routers, also used to study other protocols in data networks as well as automated network configuration and management. The lab also houses a sensor network testbed.

Bioimage Laboratory

Uses computer gaming hardware for enhanced and affordable 3-D visualization, along with techniques from information theory and machine learning to combine the exquisite capabilities of the human visual system with computational sensing techniques for analyzing vast quantities of image sequence data.

Data Fusion Laboratory

The Data Fusion Laboratory investigates problems in multisensory detection and estimation, with applications in robotics, digital communications, radar, and target tracking. Among the projects in progress: computationally efficient parallel distributed detection architectures, data fusion for robot navigation, modulation recognition and RF scene analysis in time-varying environments, pattern recognition in biological data sequences and large arrays, and hardware realizations of data fusion architectures for target detection and target tracking.

Drexel Network Modeling Laboratory

The Drexel Network Modeling Laboratory investigates problems in the mathematical modeling of communication networks, with specific focus on wireless ad hoc networks, wireless sensor networks, and supporting guaranteed delivery service models on best effort and multipath routed networks. Typical methodologies employed in our research include mathematical modeling, computer simulation, and performance optimization, often with the end goal of obtaining meaningful insights into network design principles and fundamental performance tradeoffs.

Drexel Power-Aware Computing Laboratory

The Power-Aware Computing Lab (http://dpac.ece.drexel.edu) investigates methods to increase energy efficiency across the boundaries of circuits, architecture, and systems. Our recent accomplishments include the Sigil profiling tool, scalable modeling infrastructure for accelerator implementations, microarchitecture-aware VDD gating algorithms, an accelerator architecture for ultrasound imaging, evaluation of hardware reference counting, hardware and operating system support for power-agile computing, and memory systems for accelerator-based architectures.

Drexel University Nuclear Engineering Education Laboratory

The field of nuclear engineering encompasses a wide spectrum of occupations, including nuclear reactor design, medical imaging, homeland security, and oil exploration. The Drexel University Nuclear Engineering Education Laboratory (DUNEEL) provides fundamental hands on understanding for power plant design and radiation detection and analysis. Software based study for power plant design, as well as physical laboratory equipment for radiation detection, strengthen the

underlying concepts used in nuclear engineering such that the student will comprehend and appreciate the basic concepts and terminology used in various nuclear engineering professions. Additionally, students use the laboratory to develop methods for delivering remote, live time radiation detection and analysis. The goal of DUNEEL is to prepare students for potential employment in the nuclear engineering arena.

Drexel VLSI Laboratory

The Drexel VLSI Laboratory (http://ece.drexel.edu/faculty/taskin/wiki/vlsilab/index.php/Main_Page) investigates problems in the design, analysis, optimization and manufacturing of high performance (low power, high throughput) integrated circuits in contemporary CMOS and emerging technologies. Suited with industrial design tools for integrated circuits, simulation tools and measurement beds, the VLSI group is involved with digital and mixed-signal circuit design to verify the functionality of the discovered novel circuit and physical design principles. The Drexel VLSI laboratory develops design methodologies and automation tools in these areas, particularly in novel clocking techniques, featuring resonant clocking, and interconnects, featuring wireless interconnects.

Drexel Wireless Systems Laboratory

The Drexel Wireless Systems Laboratory (DWSL) contains an extensive suite of equipment for constructing, debugging, and testing prototype wireless communications systems. Major equipment within DWSL includes:

- three software defined radio network testbeds (HYDRA, USRP, and WARP) for rapidly prototyping radio, optical and ultrasonic communications systems,
- a TDK RF anechoic chamber and EMSCAN desktop antenna pattern measurement system,
- a materials printer and printed circuit board milling machine for fabricating conformal antennas and
- wireless protocol conformance testing equipment from Aeroflex.

The lab is also equipped with network analyzers, high speed signal generators, oscilloscopes, and spectrum analyzers as well as several Zigbee development platforms for rapidly prototyping sensor networks.

DWSL personnel also collaborate to create wearable, fabric based transceivers through collaboration with the Shima Seiki Haute Laboratory in the Drexel ExCITe Center. The knitting equipment at Drexel includes sixteen SDS-ONE APEX3 workstations and four state-of-the-art knitting machines. The workstations accurately simulate fabric construction and provide researchers and designers the opportunity to program, create and simulate textile prototypes, import CAD specifications of final products, and produce made-to-measure or mass-produced pieces on Shima Seiki knitting machines. For testing smart textiles for biomedical, DWSL personnel also have collaborators in the Center for Interdisciplinary Clinical Simulation and Practice (CICSP) in the Drexel College of Medicine which provides access to medical mannequin simulators.

Ecological and Evolutionary Signal-processing and Informatics Laboratory

The Ecological and Evolutionary Signal-processing and Informatics Laboratory (EESI) (http://www.ece.drexel.edu/gailr/EESI) seeks to solve problems in high-throughput genomics and engineer better solutions for biochemical applications. The lab's primary thrust is to enhance the use of high-throughput DNA sequencing technologies with pattern recognition and signal processing techniques. Applications include assessing the organism content of an environmental sample, recognizing/classifying potential and functional genes, inferring environmental factors and inter-species relationships, and inferring microbial evolutionary relationships from short-read DNA/RNA fragments. The lab also investigates higher-level biological systems such as modeling and controlling chemotaxis, the movement of cells.

Electric Power Engineering Center

This newly established facility makes possible state-of-the-art research in a wide variety of areas, ranging from detailed theoretical model study to experimental investigation in its high voltage laboratories. The mission is to advance and apply scientific and engineering knowledge associated with the generation, transmission, distribution, use, and conservation of electric power. In pursuing these goals, this center works with electric utilities, state and federal agencies, private industries, nonprofit organizations and other universities on a wide spectrum of projects. Research efforts, both theoretical and experimental, focus on the solution of those problems currently faced by the electric power industry. Advanced concepts for electric power generation are also under investigation to ensure that electric power needs will be met at the present and in the future.

Electronic Design Automation Facility

Industrial-grade electronic design automation software suite and intergrated design environment for digital, analog and mixed-signal systems development. Field Programmable Gate Array (FPGA) development hardware. Most up-to-date FPGA/embedded system development hardware kits. Printed circuit board production facility. Also see Drexel VLSI Laboratory.

Microwave-Photonics Device Laboratories

The laboratory is equipped with test and measurement equipment for high-speed analog and digital electronics and fiber optic systems. The test equipment includes network analyzers from Agilent (100kHz- 1.3 GHz and 45 Mhz-40 GHz), and Anritsu (45 MHz-6 GHz); spectrum analyzers from Tektronix, HP, and Agilent with measurement capability of DC to 40 GHz and up to 90 GHz using external mixers; signal generators and communication channel modulators from HP, Rhode-Schwartz, Systron Donner, and Agilent; microwave power meter and sensor heads, assortment of passive and active microwave components up to 40 GHz ; data pattern generator and BER tester up to 3Gb/s; optical spectrum analyzer from Anritsu and power meters from HP; single and multimode fiber optic based optical transmitter and receiver boards covering ITU channels at data rates up to 10Gb/s; passive optical components such as isolator, filter, couplers, optical connectors and fusion splicer; LPKF milling machine for fabrication of printed circuit boards; wire-bonding and Cascade probe stations; Intercontinental test fixtures for testing of MMIC circuits and solid-state transistors; state-of-the-art microwave and electromagnetic CAD packages such as Agilent ADS, ANSYS HFSS, and COMSOL multi-physics module.

Music and Entertainment Technology Laboratory

The Music and Entertainment Technology Laboratory (MET-lab) is devoted to research in digital media technologies that will shape the future of entertainment, especially in the areas of sound and music. We employ digital signal processing and machine learning to pursue novel applications in music information retrieval, music production and processing technology, and new music interfaces. The MET-lab is also heavily involved in outreach programs for K-12 students and hosts the Summer Music Technology program, a one-week learning experience for high school students. Lab facilities include a sound isolation booth for audio and music recording, a digital audio workstation running ProTools,

two large multi-touch display interfaces of our own design, and a small computing cluster for distributed processing.

NanoPhotonics+ Lab (http://drexelnanophotonics.com)

Our research is primarily in the area of nanophotonics with a focus on the nanoscale interaction of light with matter. Interests include: liquid crystal/polymer composites for gratings, lenses and HOEs; liquid crystal interactions with surfaces and in confined nanospaces; alternative energy generation through novel photon interactions; ink-jet printed conducting materials for RF and photonic applications; and the creation and development of smart textiles technologies including soft interconnects, sensors, and wireless implementations.

Opto-Electro-Mechanical Laboratory

This lab concentrates on the system integration on optics, electronics, and mechanical components and systems, for applications in imaging, communication, and biomedical research. Research areas include: Programmable Imaging with Optical Micro-electrical-mechanical systems (MEMS), in which microscopic mirrors are used to image light into a single photodetector; Pre-Cancerous Detection using White Light Spectroscopy, which performs a cellular size analysis of nuclei in tissue; Free-space Optical Communication using Space Time Coding, which consists of diffused light for computer-to-computer communications, and also tiny lasers and detectors for chip-to-chip communication; Magnetic Particle Locomotion, which showed that particles could swim in a uniform field; and Transparent Antennas using Polymer, which enables antennas to be printed through an ink-jet printer.

Plasma and Magnetics Laboratory

Research is focused on applications of electrical and magnetic technologies to biology and medicine. This includes the subjects of non-thermal atmospheric pressure plasma for medicine, magnetic manipulation of particles for drug delivery and bio-separation, development of miniature NMR sensors for cellular imaging and carbon nanotube cellular probes.

Power Electronics Research Laboratory

The Power Electronics Research Laboratory (PERL) is involved in circuit and design simulation, device modeling and simulation, and experimental testing and fabrication of power electronic circuits. The research and development activities include electrical terminations, power quality, solar photovoltaic systems, GTO modeling, protection and relay coordination, and solid-state circuit breakers. The analysis tools include EMPT, SPICE, and others, which have been modified to incorporate models of such controllable solid-state switches as SCRs, GTOs, and MOSFETs. These programs have a wide variety and range of modeling capabilities used to model electromagnetics and electromechanical transients ranging from microseconds to seconds in duration. The PERL is a fully equipped laboratory with 42 kVA AC and 70 kVA DC power sources and data acquisition systems, which have the ability to display and store data for detailed analysis. Some of the equipment available is a distribution and HV transformer and three phase rectifiers for power sources and digital oscilloscopes for data measuring and experimental analysis. Some of the recent studies performed by the PERL include static VAR compensators, power quality of motor controllers, solid-state circuit breakers, and power device modeling which have been supported by PECO, GE, Gould, and EPRI.

RE Touch Lab

The RE Touch Lab is investigating the perceptual and mechanical basis of active touch perception, or haptics, and the development of new technologies for stimulating the sense of touch, allowing people to touch, feel, and interact with digital content as seamlessly as we do with objects in the real world. We study the scientific foundations of haptic perception and action, and the neuroscientific and biomechanical basis of touch, with a long-term goal of uncovering the fundamental perceptual and mechanical computations that enable haptic interaction. We also create new technologies for rendering artificial touch sensations that simulate those that are experienced when interacting with real objects, inspired by new findings on haptic perception.

Testbed for Power-Performance Management of Enterprise Computing Systems

This computing testbed is used to validate techniques and algorithms aimed at managing the performance and power consumption of enterprise computing systems. The testbed comprises a rack of Dell 2950 and Dell 1950 PowerEdge servers, as well as assorted desktop machines, networked via a gigabit switch. Virtualization of this cluster is enabled by VMWare's ESX Server running the Linux RedHat kernel. It also comprises of a rack of ten Apple Xserve machines networked via a gigabit switch. These servers run the OS X Leopard operating systems and have access to a RAID with TBs of total disk capacity.

Electrical and Computer Engineering Faculty

Fernand Cohen, PhD *(Brown University)*. Professor. Surface modeling; tissue characterization and modeling; face modeling; recognition and tracking.

Kapil Dandekar, PhD *(University of Texas-Austin) Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean of Research, College of Engineering*. Professor. Cellular/mobile communications and wireless LAN; smart antenna/MIMO for wireless communications; applied computational electromagnetics; microwave antenna and receiver development; free space optical communication; ultrasonic communication; sensor networks for homeland security; ultrawideband communication.

Afshin Daryoush, ScD *(Drexel University)*. Professor. Digital and microwave photonics; nonlinear microwave circuits; RFIC; medical imaging.

Bruce A. Eisenstein, PhD *(University of Pennsylvania) Interim Dean, College of Engineering*. Professor. Pattern recognition; estimation; decision theory.

Adam K. Fontecchio, PhD *(Brown University) Electrical and Computer Engineering*. Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Gary Friedman, PhD *(University of Maryland-College Park)*. Professor. Biological and biomedical applications of nanoscale magnetic systems.

Eli Fromm, PhD *(Jefferson Medical College) Roy A. Brothers University Professor / Director for Center of Educational Research*. Professor. Engineering education; academic research policy; bioinstrumentation; physiologic systems.

Edwin L. Gerber, PhD *(University of Pennsylvania) Assistant Department Head for Evening Programs.* Professor. Computerized instruments and measurements; undergraduate engineering education.

Allon Guez, PhD *(University of Florida).* Professor. Intelligent control systems; robotics, biomedical, automation and manufacturing; business systems engineering.

Mark Hempstead, PhD *(Harvard University) Junior Colehower Chair.* Assistant Professor. Computer engineering; power-aware computing; computer architecture; low power VLSI Design; wireless sensor networks.

Peter R. Herczfeld, PhD *(University of Minnesota) Lester A. Kraus Professor/Director, Center for Microwave/Lightwave Engineering.* Professor. Lightwave technology; microwaves; millimeter waves; fiberoptic and integrated optic devices.

Leonid Hrebien, PhD *(Drexel University) Graduate Advisor and Assistant Department Head for Graduate Affairs.* Professor. Tissue excitability; acceleration effects on physiology; bioinformatics.

Paul R. Kalata, PhD *(Illinois Institute of Technology).* Associate Professor. Stochastic and adaptive control theory; identification and decision theory; Kalman filters.

Moshe Kam, PhD *(Drexel University) Robert G. Quinn Professor of Electrical and Computer Engineering and Department Head.* Professor. Decision fusion and sensor fusion; mobile robots (especially robot navigation); pattern recognition (especially in handwriting applications); optimization and control.

Nagarajan Kandasamy, PhD *(University of Michigan).* Associate Professor. Embedded systems, self-managing systems, reliable and fault-tolerant computing, distributed systems, computer architecture, and testing and verification of digital systems.

Bruce Katz, PhD *(University of Illinois).* Adjunct Professor. Speech communication and computer science; artificial intelligence.

Youngmoo Kim, PhD *(MIT).* Associate Professor. Audio and music signal processing, voice analysis and synthesis, music information retrieval, machine learning.

Timothy P. Kurzweg, PhD *(University of Pittsburgh).* Associate Professor. Optical MEM modeling and simulation; system-level simulation; computer architecture.

Karen Miu, PhD *(Cornell University).* Professor. Power systems; distribution networks; distribution automation; optimization; system analysis.

Bahram Nabet, PhD *(University of Washington) Associate Dean for Special Projects, College of Engineering; Electrical and Computer Engineering.* Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Prawat Nagvajara, Ph.D. *(Boston University).* Associate Professor. System on a chip; embedded systems; power grid computation; testing of computer hardware; fault-tolerant computing; VLSI systems; error control coding.

Dagmar Niebur, Ph.D. *(Swiss Federal Institute of Technology).* Associate Professor. Intelligent systems; dynamical systems; power system monitoring and control.

Chika Nwankpa, PhD *(Illinois Institute of Technology).* Professor. Power system dynamics; power electronic switching systems; optically controlled high power switches.

Karkal S. Prahbu, PhD *(Harvard University).* Auxiliary Professor. Computer and software engineering; advanced microprocessors and distributed operating systems.

Gail L. Rosen, PhD *(Georgia Institute of Technology).* Associate Professor. Signal processing, signal processing for biological analysis and modeling, bio-inspired designs, source localization and tracking.

Kevin J. Scoles, PhD *(Dartmouth College) Associate Dean, College of Engineering, Office of Student Services.* Associate Professor. Microelectronics; electric vehicles; solar energy; biomedical electronics.

Harish Sethu, PhD *(Lehigh University).* Associate Professor. Protocols, architectures and algorithms in computer networks; computer security; mobile ad hoc networks; large-scale complex adaptive networks and systems.

P. Mohana Shankar, PhD *(Indian Institute of Technology) Allen Rothwarf Professor of Electrical and Computer Engineering.* Professor. Wireless communications; biomedical ultrasonics; fiberoptic bio-sensors.

Baris Taskin, PhD *(University of Pittsburgh).* Associate Professor. Electronic design automation (EDA) of integrated circuits, high-performance VLSI circuits and systems, sequential circuit timing and synchronization, system-on-chip (SOC) design, operational research, VLSI computer-aided design.

Lazar Trachtenberg, DSc *(Israel Institute of Technology).* Professor. Fault tolerance; multi-level logic synthesis; signal processing; suboptimal filtering.

Oleh Tretiak, ScD *(MIT) Robert C. Disque Professor of Electrical and Computer Engineering.* Professor. Image processing; tomography; image registration; pattern recognition.

John MacLaren Walsh, PhD *(Cornell University).* Assistant Professor. Performance and convergence of belief/expectation propagation and turbo decoding/equalization/synchronization, permeation models for ion channels, composite adaptive systems theory.

Steven Weber, PhD *(University of Texas-Austin) Assistant Department Head for Graduate Affairs, Electrical and Computer Engineering.* Associate Professor. Mathematical modeling of computer and communication networks, specifically streaming multimedia and ad hoc networks.

Jaudelice Cavalcante de Oliveira, PhD *(Georgia Institute of Technology).* Associate Professor. Next generation Internet; quality of service in computer communication networks; wireless networks.

Interdepartmental Faculty

Dov Jaron, PhD *(University of Pennsylvania) Calhoun Distinguished Professor of Engineering in Medicine.* Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Jeremy R. Johnson, PhD *(Ohio State University).* Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

John Lacontora, PhD *(New Jersey Institute of Technology).* Associate Research Professor. Service engineering; industrial engineering.

Ryszard Lec, PhD *(University of Warsaw Engineering College)*. Professor. Biomedical applications of visoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Spiros Mancoridis, PhD *(University of Toronto) Interim Department Head, Computer Science*. Professor. Software engineering; software security; code analysis; evolutionary computation.

Karen Moxon, PhD *(University of Colorado)*. Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Paul Y. Oh, PhD *(Columbia University) Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics*. Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Banu Onaral, Ph.D. *(University of Pennsylvania) H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD *(Rensselaer Polytechnic University)*. Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

William C. Regli, PhD *(University of Maryland-College Park)*. Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Arye Rosen, PhD *(Drexel University) Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Jonathan E. Spanier, PhD *(Columbia University) Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Aydin Tozeren, PhD *(Columbia University) Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Aspasia Zerva, PhD *(University of Illinois)*. Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Emeritus Faculty

Richard L. Coren, PhD *(Polytechnic Institute of Brooklyn)*. Professor Emeritus. Electromagnetic fields, antennas, shielding, RFI, cybernetics of evolving systems.

Robert Fischl, PhD *(University of Michigan) John Jarem Professor Emeritus / Director, Center for Electric Power Engineering*. Professor Emeritus. Power: systems, networks, controls, computer-aided design, power systems, solar energy.

Vernon L. Newhouse, PhD *(University of Leeds) Disque Professor Emeritus*. Professor Emeritus. Biomedical and electrophysics: ultrasonic flow measurement, imaging and texture analysis in medicine, ultrasonic nondestructive testing and robot sensing, clinical engineering.

Hun H. Sun, PhD *(Cornell University) Ernest O. Lange Professor Emeritus*. Professor Emeritus. Systems and signals in biomedical control systems.

Engineering Management

Major: Engineering Management
Degree Awarded: Master of Science
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 15.1501
Standard Occupational Classification (SOC) code: 11-9041

About the Program

The Engineering Management Program (http://www.drexel.edu/egmt) is designed to provide the background in management science necessary to advance from purely technical positions to supervisory responsibilities in such areas as research and development, production, engineering, design, and technical marketing. Study can be on a part-time or full-time basis, and all courses are offered online.

In our increasingly complex, technologically-oriented economy, demand has risen for professionals with the expertise to manage both human and technological resources — a combination of talents crucial to organizations competing in the global marketplace. Students graduating with the master's in engineering management are significantly better positioned to meet the challenge.

Engineering management is a multidisciplinary program offering a core curriculum and specialization in a selected area of technology or management. Majors in engineering management must hold a bachelor's degree in engineering, basic science, or a related field. The program is open to those professionals who aspire to be engineering or technically based managers.

Dual-Degree Requirements

Students may simultaneously pursue the master's in engineering management and another master's degree. Students must satisfy program requirements for each degree, with a maximum of 15.0 credits transferred from one program to the other. (The master's in engineering management requires 45.0 credits; if the other degree requires 45.0 credits, then 60.0 credits are required under the dual degree program.) Approval for the dual degree program must be obtained from the program advisor in each department or program.

Graduate Co-op Program (GCP)

The Graduate Co-op Program (graduate intern or co-op program) is available to master's-level engineering management students. The opportunity to spend six months in industry provides a significant opportunity for the engineer in transition to management. Through Drexel's Steinbright Career Development Center (http://www.drexel.edu/scdc/coop/graduate), students can explore new career directions. This program requires 6.0 additional credits, 3.0 for each term in industry.

Certificate Opportunity

The Engineering Management Program also offers a four-course Graduate Certificate in Engineering Management.

Students can apply to pursue the Graduate Certificate in Engineering Management, earn the credential, and subsequently apply those credits toward completion of a master's in engineering management. However,

current students in pursuit of the master's in engineering management may not simultaneously pursue the graduate certificate.

Non-engineering management graduate students in the College of Engineering (including those in the accelerated bachelor's/master's program) are welcome to apply for the certificate, with advisor approval, and they can do so while simultaneously pursuing their primary degree.

Additional Information

For more information about the program, visit the Drexel Online Engineering Management (http://www.drexel.com/online-degrees/engineering-degrees/ms-egmt) program page.

Admission Requirements

Admission to this program requires:

- A four-year bachelor of science degree in engineering from an ABET-accredited institution in the United States or an equivalent international institution. Bachelor's degrees in math or the physical sciences may also be considered for provisional admission.
- Minimum cumulative undergraduate GPA of 3.0. If any other graduate work has been completed, the average GPA must be at least 3.0.
- Complete graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation, professional or academic (professional preferred).
- Resume
- A 750-word essay on one of two prompts: technical analysis problem or human resource problem (details of each problem are included in the essay tab of the online application).
- International students must submit an Internet-based TOEFL (IBT = score of 100 or higher).

At least five years of relevant professional work experience are recommended, but not required.

Interested students should complete the Drexel University Online admission application (http://www.drexel.com/online-degrees/engineering-degrees/ms-egmt/admissions.aspx) for admission into this online program.

Degree Requirements

The master's in engineering management degree requires 45.0 credits, including 30.0 credits in required core courses and 15.0 graduate elective credits. These electives may be taken in other colleges at Drexel consistent with the plan of study and any required prerequisites.

Students may take their required elective credits from any graduate-level course(s) in engineering, business, or another college for which they have adequate preparation and can obtain approvals from the college and the engineering management program.

All candidates are encouraged to discuss areas of interest with the program advisor and to develop a proposed plan of study during the early stages of the program.

Note: Specific course requirements will be waived for students who have taken equivalent courses elsewhere.

Engineering Management		
EGMT 501	Engineering Management	3.0
EGMT 502	Advanced Engineering Management	3.0
EGMT 504	Engineering Management Communications	3.0
EGMT 581	Human Relations and Organizational Behavior	3.0
Quantitative Analysis		
EGMT 571	Managerial Statistics	3.0
EGMT 572	Statistical Data Analysis *	3.0
EGMT 573	Operations Research	3.0
Economics and Financial Management		
EGMT 531	Engineering Economic Evaluation & Analysis	3.0
EGMT 535	Financial Management	3.0
Engineering Management Capstone		
EGMT 692	Engineering Management Capstone	3.0
Electives		
Select five of the following electives: **		15.0
EGMT 536	Advanced Financial Management for Engineers	
EGMT 650	Engineering Leadership	
Marketing & Business Development		
EGMT 614	Marketing: Identifying Customer Needs	
EGMT 615	Product Conceptualization and Development	
EGMT 616	Technology Conceptualization and Development	
EGMT 660	Sustainable Business Practices for Engineers	
Project Management		
EGMT 620	Engineering Project Management	
EGMT 625	Project Planning, Scheduling and Control	
EGMT 630	Global Engineering Project Management	
Systems Engineering & Systems Thinking		
EGMT 635	Visual System Mapping	
EGMT 685	Systems Engineering Management	
EGMT 688	Systems Engineering Analysis I	
EGMT 690	Systems Engineering Analysis II	
Engineering Law & Ethics		
EGMT 610	Ethics & Business Practices for Engineers	
EGMT 652	Engineering Law	
Other Approved Electives		
EGMT 680	Course EGMT 680 Not Found	
SYSE 510	Systems Engineering Process	
SYSE 511	Systems Engineering Tools	
SYSE 520	Sustainment and Integrated Logistics	
SYSE 521	Integrated Risk Management	
SYSE 522	Supply Chain Systems Engineering	
SYSE 523	Systems Reliability Engineering	
SYSE 524	Systems Reliability, Availability & Maintainability Analysis	
SYSE 525	Statistical Modeling & Experimental Design	
SYSE 530	Systems Engineering Design	
SYSE 531	Systems Architecture Development	
SYSE 532	Software Systems Engineering	
SYSE 533	Systems Integration and Test	
Total Credits		**45.0**

*   EGMT 572 Statistical Data Analysis requires as a prerequisite EGMT 571 Managerial Statistics or approval from the program administration to complete a waiver and request to take then pass the STAT Placement Exam in place of EGMT 571. If approved for the waiver of EGMT 571, students will be eligible to complete an upper level course substitution to satisfy the degree requirements. More information on this option is available on the Engineering Management website (http://www.drexel.edu/egmt/programs/onlinemasters/EGMT%20571).

**   Students may select electives from other disciplines outside of Engineering Management with prior approval from their advisor.

Certificate in Engineering Management

Certificate Level: Graduate
Admissions Requirements: Undergraduate degree in engineering
Certificate Type: Graduate Certificate
Number of Credits to Completion: 12.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 15.1501
Standard Occupational Classification (SOC) Code: 11-9040
Gainful Employment Statistics (http://deptapp08.drexel.edu/gainfulemployment/Engineering_management/gedt.html)

This program is a superb training ground for engineers and scientists who want to obtain a solid foundation in critical areas in management, communications, economics and finance without having to commit to the entire graduate program. After completing the program, students have the option of applying the earned credits toward a master's degree in engineering management.

Admission to this program requires:

- A four-year bachelor of science degree in engineering from an ABET-accredited institution in the United States or an equivalent international institution. Bachelor's degrees in math or the physical sciences may also be considered for provisional admission.
- Minimum cumulative undergraduate GPA of 3.0. If any other graduate work has been completed, the average GPA must be at least 3.0.
- Complete graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation, professional or academic (professional preferred).
- Resume
- A 750-word essay on one of two prompts: technical analysis problem or human resource problem (details of each problem are included in the essay tab of the online application).
- International students must submit an Internet-based TOEFL (IBT = score of 100 or higher).

At least five years of relevant professional work experience are recommended, but not required.

Continuing master's students pursuing other technical disciplines may also complete the certificate courses as electives with approval from their advisor (e.g., electrical engineering master's students may complete these four courses to satisfy four of their five elective requirements).

This certificate is awarded to students who successfully complete the following four graduate-level courses from the master's in engineering management (p. 314) curriculum:

Requirements

EGMT 501	Engineering Management	3.0
EGMT 504	Engineering Management Communications	3.0
EGMT 531	Engineering Economic Evaluation & Analysis	3.0
EGMT 535	Financial Management	3.0
Total Credits		**12.0**

The program is administered through Drexel Online. Applications to the certificate program are managed by Drexel Online. For the most current admission information, please visit www.drexel.com (http://www.drexel.com/online-degrees/engineering-degrees/cert-egmt).

Engineering Management Faculty

James Breen, MBA, PE *(Drexel University).* Adjunct Instructor. Vice President of Manufacturing Network Strategy at Johnson & Johnson.

James C. Deiner, MBA *(Cornell University).* Adjunct Instructor. IT projects in the pharmaceutical, logistics and financial services industries.

James Lill, MS, PE *(Drexel University).* Adjunct Instructor. Director of Facilities, Planning and Management for the Downingtown Area School District.

Carol Mablekos, PhD *(Purdue University).* Adjunct Instructor. Public speaking, technical writing, organizational behavior, and business writing courses.

Milena McCall, PhD *(New York University).* Adjunct Instructor. Managerial communications.

Miray Pereira, MBA *(Rutgers University).* Adjunct Instructor. Manages a team of consultants responsible for development, facilitation and implementation of fundamental demand management systems and capabilities for DuPont, most recently with the DuPont Safety & Protection Platform in strategic planning, mergers & acquisitions.

Fredric Plotnick, PhD, JD, PE *(Drexel University; Widener University).* Adjunct Professor. CEO and principal consultant of Engineering & Property Management Consultants, Inc.

Dave Reifschneider, BS *(University of Delaware) Assistant Director, Enrollment Management, College of Engineering.* Adjunct Instructor. Creating strategic customer relationships and commercializing new products.

Stephen Smith, PhD *(Drexel University).* Associate Teaching Professor. Development of online learning and distance teaching/learning techniques for engineering.

Fernando Tovia, PhD *(University of Arkansas).* Adjunct Instructor. Core quantitative analysis,strategic planning, supply chain management and manufacturing systems.

John Via, EngD *(Southern Methodist University) Director of Engineering Management and the Associate Dean of Engineering for Online Programs at Drexel University.* Teaching Professor.

Interdepartmental Faculty

Robert Brehm, PhD *(Drexel University).* Associate Teaching Professor. International infrastructure delivery; response to natural catastrophes; risk assessment and mitigation strategies; project management techniques.

Environmental Engineering

Major: Environmental Engineering
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.1401
Standard Occupational Classification (SOC) code: 17-2081

About the Program

Programs in environmental engineering are available with specializations in air pollution, hazardous and solid waste, subsurface contaminant hydrology, water resources, water and wastewater, and sustainability treatment.

Environmental engineering is concerned with protecting human, animal, and plant populations from the effects of adverse environmental factors, including toxic chemicals and wastes, pathogenic bacteria, and global warming.
Environmental engineers also try to minimize the effect of human activities on the physical and living environment so that we can all live more healthy and sustainable lives. This field builds on other branches of engineering, especially civil, chemical, and mechanical engineering. It also builds on information from many of the sciences, such as chemistry, physics, hydrology, geology, atmospheric science, and several specializations of biology (ecology, microbiology) and public health. Students who elect to study environmental engineering will become familiar with many of these areas because maintaining and improving the environment requires that problems be evaluated and solutions found using a multidisciplinary approach.

For more information about this program, visit the MS in Environmental Engineering (http://www.drexel.edu/cae/academics/grad-doctoral-programs) web page.

Admission Requirements

In addition to the general entrance requirements for all environmental engineering applicants, entrance to the MS in Environmental Engineering program requires an undergraduate engineering degree from an ABET-approved institution. Students lacking this credential will be required to complete additional undergraduate courses to incorporate related elements of the functional equivalent of the ABET engineering BS degree. Typically, courses must be taken in computer programming, differential equations, linear algebra and fluid mechanics.

For additional information on how to apply, visit Drexel's Admissions page for Environmental Engineering (http://www.drexel.edu/grad/programs/coe/environmental-engineering).

Degree Requirements

The MS in Environmental Engineering program requires 45.0 credits of coursework. Both a theses and a non-thesis option are available. It is possible to finish the MS degree on either a part-time or full-basis. The degree consists of a set of core courses, a sequence in one of several areas of emphasis (treatment process, human risks, water resources,

environmental modeling, and air quality) and completion of cognate and elective sequences. After the first term of study, a detailed plan of study is developed with the student's graduate advisor.

Core Courses

ENVE 660	Chemical Kinetics in Environmental Engineering	3.0
ENVS 501	Chemistry of the Environment	3.0
ENVS 516	Sanitary Microbiology	3.0
Statistics Course (for example, ENVS 506 Biostatistics)		3.0
Environmental Policy Course		3.0
Additional Sequence Courses, Electives, and/or Thesis course		30.0
Total Credits		**45.0**

Degree Requirements

Applicants to the doctoral program are judged on the basis of academic excellence and the alignment of their research interests with those of the faculty in the School. To be awarded the PhD, students must complete a major research project publishable in peer-reviewed journals. The degree requires a total of 90.0 credits; credits earned toward a master's degree may apply toward the 90.0 credits. There is no prescribed coursework —students must take courses needed to complete their research under guidance of an academic advisor. There is a one-year residency requirement. Students must successfully pass the candidacy examination, the proposal defense, and a PhD dissertation and oral defense. Prospective PhD student are welcome to contact the Department (http://www.drexel.edu/cae) to discuss their research interests.

Dual Degree

Dual MS Degree

The university encourages students with broad interest to consider a dual-master's option. Students can simultaneously work on two master's degree, applying to both programs a limited number of credits (a maximum of 15.0 to each). Applicants interested in a dual degree should apply for just one program; once enrolled at Drexel, the student may then request admission to the second program. The graduate advisors from both degree programs must approve the student's enrollment, and they must approve the transfer of credits from one program to another. Applicants considering two degrees are encouraged to contact the appropriate academic departments.

Bachelor's/Master's Dual Degree Program

The BS/MS dual degree is an accelerated program providing the academically qualified student an opportunity to simultaneously earn both BS and MS degrees (two diplomas are awarded) in program areas of his/her choice in five years, the time normally required to finish a bachelor's degree alone. Because both degrees are completed in the time usually required for the bachelor's degree, both degrees may be completed at the undergraduate tuition rate.

The five-year completion period is possible because fewer undergraduate credits are required for the combined degrees (180.0 credits instead of 192.0 credits). Also, co-op experience may be adjusted (two co-op periods instead of three) giving the BS/MS student two additional quarters to take courses. If needed, students may also take evening courses while on co-op.

The program combines the practical work experience of Drexel undergraduate cooperative education with the graduate credentials of an advanced degree. Students may earn both degrees in the same major,

or may complete their master's degree in a different field. With both an undergraduate and graduate degree and practical work experience, BS/MS graduates enter the work force with specialized knowledge and training.

Students interested in the Environmental Engineering BS/MS program, may contact Dr. Charles N. Haas at haas@drexel.edu for more information.

Facilities

The Department of Civil, Architectural, and Environmental Engineering is well equipped with state-of-the-art facilities:

- Analytical instrumentation for measuring biological and chemical contaminants in air, water and land
- Field sampling equipment for water and air measurements
- Molecular biology capability
- Computational facilities including access to multi-processor clusters, and advanced simulation and data analysis software

Civil, Architectural and Environmental Engineering Faculty

Emin A. Aktan, PhD *(University of Illinois at Urbana-Champaign) John Roebling Professor of Infrastructure Studies*. Professor. Structural engineering; infrastructure; evaluation; intelligent systems.

Ivan Bartoli, PhD *(University of California, San Diego)*. Assistant Professor. Non-destructive evaluation and structural health monitoring; dynamic identification, stress wave propagation modeling.

Robert Brehm, PhD *(Drexel University)*. Associate Teaching Professor. International infrastructure delivery; response to natural catastrophes; risk assessment and mitigation strategies; project management techniques.

S.C. Jonathan Cheng, PhD *(West Virginia University)*. Associate Professor. Soil mechanics; geosynthetics; probabilistic design; landfill containments.

Louis DaSaro, MS *(University of Delaware)*. Associate Teaching Professor. Failure analysis and restoration of existing structures, blast resistant structures, green structures, engineering education.

Patricia Gallagher, PhD *(Virginia Polytechnic Institute)*. Associate Professor. Soil mechanics; geoenvironmental; ground improvement; sustainability.

Patrick Gurian, PhD *(Carnegie-Mellon University)*. Associate Professor. Risk analysis of environmental and infrastructure systems, novel adsorbent materials, environmental standard setting, Bayesian statistical modeling, community outreach and environmental health.

Charles N. Haas, PhD *(University of Illinois-Urbana) L. D. Betz Professor and Department Head, Civil, Architectural and Environmental Engineering*. Professor. Control of human exposures to and risk assessment of pathogenic organisms; water and waste treatment; homeland security.

Ahmad Hamid, PhD *(McMaster University)*. Professor. Engineered masonry; building; cladding; prestressed concrete.

Y. Grace Hsuan, PhD *(Imperial College)*. Professor. Polymeric and cementitioius materials; geosynthetic reliability and durability.

Joseph B. Hughes, PhD *(University of Iowa) Dean of the College of Engineering and Distinguished Professor*. Biological processes and applications of nanotechnology in environmental systems.

Joseph P. Martin, PhD *(Colorado State University)*. Professor. Geoenvironmental engineering; urban environmental hydrology; transportation.

James E. Mitchell, MArch *(University of Pennsylvania)*. Associate Professor. Architectural engineering design; building systems.

Franco Montalto, PhD *(Cornell University)*. Associate Professor. Effects of built infrastructure on societal water needs, ecohydrologic patterns and processes, ecological restoration, green design, water interventions.

Franklin Moon, PhD *(Georgia Institute of Technology)*. Associate Professor. Full-scale structural testing, structural dynamics, evaluation and rehabilitation of existing structures.

Joseph V. Mullin, PhD *(Pennsylvania State University)*. Senior Lecturer. Structural material behavior, engineering economy and design.

Mira S. Olson, PhD *(University of Virginia)*. Associate Professor. Groundwater; environmental fluid mechanics; hydrology.

Anu Pradhan, PhD *(Carnegie Mellon University)*. Assistant Professor. Infrastructure management, construction engineering, transportation engineering, sensing system, geographic information system, statistical machine learning.

Yared Shifferaw, PhD *(Johns Hopkins University)*. Assistant Professor. Computational and experimental mechanics, structural stability, optimization, health monitoring and hazard mitigation, sustainable structures, emerging materials, thin-walled structures and metallic structures.

Kurt Sjoblom, PhD *(Massachusetts Institute of Technology)*. Assistant Professor. Laboratory testing of geomaterials, geotechnical engineering, foundation engineering.

Sabrina Spatari, PhD *(University of Toronto)*. Assistant Professor. Research in industrial ecology; development and application of life cycle assessment (LCA) and material flow analysis (MFA) methods for guiding engineering and policy decisions; specific interest in biomass and bioenergy, biofuels, and urban infrastructure.

Michael Waring, PhD *(University of Texas-Austin)*. Assistant Professor. Indoor air quality and building sustainability; indoor particulate matter fate and transport; indoor chemistry and particle formation; secondary impacts of control technologies and strategies.

Jin Wen, PhD *(University of Iowa)*. Associate Professor. Architectural engineering, building control systems, indoor air quality.

Aspasia Zerva, PhD *(University of Illinois)*. Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Interdepartmental Faculty

Eugenia Ellis, PhD *(Virginia Polytechnic State University)*. Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Bakhtier Farouk, PhD *(University of Delaware) Billings Professor of Mechanical Engineering.* Professor. Heat transfer; combustion; numerical methods; turbulence modeling; materials processing.

Emeritus Faculty

Harry G. Harris, PhD *(Cornell University).* Professor Emeritus. Structural models, dynamics of structures, plates and shells, industrialized building construction.

Robert M. Koerner, PhD *(Duke University).* Harry Bownam Professor Emeritus. Geosynthetic engineering; soil mechanics; water resources.

Richard Weggel, PhD *(University of Illinois) Samuel S. Baxter Professor Emeritus; Civil and Environmental Engineering.* Professor Emeritus. Coastal engineering; hydraulics engineering; hydrology.

Richard Woodring, PhD *(University of Illinois) Dean of Engineering Emeritus.* Professor Emeritus. Structural engineering, reinforced concrete.

Master of Engineering

Major: Engineering
Degree Awarded: Master of Engineering (ME)
Calendar Type: Quarter
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 14.0101
Standard Occupational Classification (SOC) code: 17.2199

About the Program

This ME program is a highly customizable program primarily used for International and visiting students studying engineering at Drexel. This career-focused program is designed for working professionals and those seeking employment in a manufacturing-related industry, and may not be the best choice for those who wish to earn a PhD in engineering. The ME program offers wide flexibility for those students who wish to combine technical and nontechnical study with hands-on experience in industry and laboratory research.

Admission Requirements

In addition to meeting requirements for graduate admission, which include at least a 3.0 GPA for the last two years of undergraduate study and for any graduate study, applicants must hold a bachelor's degree in engineering from an accredited institution or an equivalent. Students whose background is in science or mathematics may be accepted to the program, but they will be required to take undergraduate engineering courses. Although the Graduate Record Examination (GRE) is not required for admission, it may be required of students interested in a teaching or research assistantship. Applicants whose native language is not English and who do not have previous degrees from a U.S. institution are required to submit scores of at least 550 on the Test of English as a Foreign Language (TOEFL).

Degree Requirements

Students take a series of core and elective courses. Students work closely with and advisor to develop an individualized plan of study. A six-month period of career-related employment through Drexel's Graduate Co-op program is a requirement for full-time students. Students who are already employed as practicing engineers may apply to pursue the program on a part-time basis. A thesis is not required. The average time required to complete the master's degree is two years of full-time study or three years of part-time study.

Degree Requirements

The degree requires a total of 48.0 credits, including at least 18.0 credits from an engineering discipline core. This core may be from any engineering department: Civil and Architectural, Chemical, Electrical and Computer, Materials, or Mechanical Engineering and Mechanics. (Please refer to the appropriate departmental description in this catalog for more information about each department.) Students also complete 15.0 credits from the manufacturing core, which includes 6.0 credits in manufacturing and 9.0 credits of departmental manufacturing electives. Three credits of either engineering analysis or probability and statistics, 6.0 credits from either engineering management or the Bennett S. LeBow College of Business, and 6.0 credits of GCP round out the program.

Curriculum

Manufacturing Core Courses

MEM 687	Manufacturing Processes I	3.0
MEM 689	Computer-Aided Manufacturing	3.0
Departmental Manufacturing Electives (see below)		9.0
Departmental Engineering Core		18.0
Engineering Management/Business Requirements (see below)		6.0
Engineering Analysis/Probability and Statistics Requirement		3.0
Graduate Co-Op Program		6.0

Departmental Manufacturing Elective Courses

Select three of the following:

Chemical Engineering

CHE 525	Transport Phenomena I
CHE 554	Process Systems Engineering
CHE 560	Transport Phenomena in Biological Systems
CHE 562	Bioreactor Engineering
CHE 564	Unit Operations in Bioprocess Systems

Electrical and Computer Engineering

ECEC 541	Robotic Computer Interface Controls I
ECEC 542	Robotic Computer Interface Controls II

Materials Science and Engineering

MATE 570	Materials Processing I
MATE 651	Advanced Polymer Processing

Mechanical Engineering and Mechanics

MEM 688	Manufacturing Processes II
MEM 717	Heat Transfer in Manufacturing
MEM 727	Fluid Dynamics in Manufacturing Processes
MEM 800	Course MEM 800 Not Found

Business Core

Select two of the following courses:

LeBow College of Business

POM 620	Management of Manufacturing Firms
POM 624	Management of Service Firms

Engineering Management

EGMT 531	Engineering Economic Evaluation & Analysis
EGMT 607	Marketing: Identifying Customer Needs
EGMT 652	Engineering Law

EGMT 680	Course EGMT 680 Not Found	
Total Credits		**48.0**

Construction Management

Major: Construction Management
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.2001
Standard Occupational Classification (SOC) code: 11-9021

About the Program

The Master of Science in Construction Management program gives professionals the opportunity to develop the multidisciplinary skills required of effective construction managers. The program focuses on training professionals to meet the challenge of increasing owner demands, tighter project delivery times and increasing regulation. The program provides the leadership skills professionals need to navigate the many daily challenges construction organizations face in successfully managing construction operations.

Three concentrations are available: construction project management, real estate, and sustainability and green construction.

Program Goals

The program is designed to increase the students' breadth and depth of knowledge in the principles and practices of construction management. The program serves as an excellent platform to develop senior management for the region's construction industry.

Graduates of the Master of Science in Construction Management program will:

- exhibit strong technical and managerial skills
- apply scientific methodologies to problem solving
- think critically
- exercise creativity and inject innovation into the process
- operate at the highest level of ethical practice
- employ principles of transformational leadership

Concentrations
Three concentrations are available:
Construction Project Management
This concentration provides the knowledge and skills required to successfully manage complex construction projects. Topics include he hard skills of project management, such as estimating and budgeting, time management, and planning. Other topics include managerial and legal aspects of construction contract administration, international construction practices,strategic planning, quality management, and productivity analysis.
Real Estate
In this concentration students explore the knowledge and skills required to create, maintain, and build environments for living, working and entertainment purposes. Relevant issues include project finance, real estate as investments, design and construction, operations, development law, environmental remediation, public policy, market analysis, and architecture.

Sustainability and Green Construction

Sustainable development means integrating the decision-making process across the project team, so that every decision is made with an eye to the greatest long-term benefits. Currently, in the Leadership in Energy and Environmental Design (LEED) green building rating system, the construction process represents a significant portion of the effort required to achieve high performance building programs.This concentration is intended to explore these concepts in detail.

For additional information, view the College of Engineering's Construction Management (http://drexel.edu/engineering/programs/undergrad/Construction%20Management) web page.

Admissions Requirements

Admission to the program requires:

- A bachelor's degree in construction management or engineering, or a baccalaureate business or non-technical degree.
- A completed application
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Potential students must supply transcripts regardless of the number of credits earned or the type of school attended. If a potential student does not list all post-secondary institutions on his or her application, and these are listed on transcripts received from other institutions, processing of the application will be delayed until the remaining transcripts have been submitted.
- GPA of 3.0 or higher
- Two letters of recommendation (professional or academic)
- Up-to-date resume
- 500 word essay on why the applicant wishes to pursue graduate studies in this program
- International Students must submit a TOEFL score indicating a minimum of 600 (paper exam) or 250 (CBT exam). For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/grad/resources/international) page.

Visit the Graduate Admissions (http://www.drexel.edu/grad/programs/coe/construction-management) website for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

The Master of Science in Construction Management curriculum includes a core of 5 required courses (15.0 credits), a concentration, and 6.0 credits of culminating experience. The culminating experience includes a capstone project in construction management.

Core Foundation Courses

CMGT 501	Leadership in Construction	3.0
CMGT 505	Construction Accounting and Financial Management	3.0
CMGT 510	Construction Control Techniques	3.0
CMGT 512	Cost Estimating and Bidding Strategies	3.0
CMGT 515	Risk Management in Construction	3.0
Concentrations		15.0-24.0
Students pursue a concentration in one of the following areas:		
Construction Management Project Management Concentration		
CMGT 525	Applied Construction Project Management	

CMGT 528	Construction Contract Administration	
CMGT 530	Equipment Applications and Economy	
CMGT 532	International Construction Practices	
CMGT 538	Strategic Management in Construction	
CMGT 540	Schedule Impact Analysis	
CMGT 548	Quality Management and Construction Performance	
CMGT 550	Productivity Analysis and Improvement	

Real Estate Concentration

Select eight of the following:

CMGT 535	Community Impact Analysis	
REAL 568	Real Estate Development	
REAL 571	Advanced Real Estate Investment & Analysis	
REAL 572	Advanced Market Research & Analysis	
REAL 573	Sales & Marketing of Real Estate	
REAL 574	Real Estate Economics in Urban Markets	
REAL 575	Real Estate Finance	
REAL 576	Real Estate Valuation & Analysis	
REAL 577	Legal Issues in Real Estate Development	

Sustainability and Green Construction Concentration

CMGT 535	Community Impact Analysis	
CMGT 545	Sustainable Principles & Practices	
CMGT 546	Sustainable Technologies	
CMGT 547	LEED Concepts	
CMGT 558	Community Sustainability	

Culminating Experience | | 6.0 |

CMGT 696	Capstone Project in Construction Management I	
CMGT 697	Capstone Project in Construction Management II	
Total Credits		**45.0**

The certificate in construction management has been designed for professionals to develop the multidisciplinary skills required of effective construction managers.

Students have the option of completing this 18.0 credit certificate in construction management as a stand-alone professional development credential, or as a step toward the MS in Construction Management program.

The admissions process for this program is the same as for the MS in Construction Management. (p. 320)

Requirements

CMGT 510	Construction Control Techniques	3.0
CMGT 512	Cost Estimating and Bidding Strategies	3.0
CMGT 515	Risk Management in Construction	3.0
CMGT 525	Applied Construction Project Management	3.0
CMGT 528	Construction Contract Administration	3.0
CMGT 538	Strategic Management in Construction	3.0
Total Credits		**18.0**

This graduate certificate seeks to produce professionals with the knowledge, skills, and perspective required to be successful in the real estate development process and the industry as a whole. Students explore the knowledge and skills required to create, maintain, and build environments for living, working and entertainment purposes.

Relevant issues include project finance, real estate as investments, design and construction, operations, development law, environmental remediation, public policy, market analysis, and architecture.

Students wising to complete this certificate in the context of a master's degree should consider the MS in Construction Management (p. 320) with a concentration in Real Estate.

Requirements

REAL 568	Real Estate Development	3.0
REAL 571	Advanced Real Estate Investment & Analysis	3.0
REAL 572	Advanced Market Research & Analysis	3.0
REAL 575	Real Estate Finance	3.0
REAL 577	Legal Issues in Real Estate Development	3.0
Select one of the following:		3.0
REAL 573	Sales & Marketing of Real Estate	
REAL 574	Real Estate Economics in Urban Markets	
REAL 576	Real Estate Valuation & Analysis	
Total Credits		**18.0**

The architectural, engineering, and construction community faces the daunting task of providing a built environment which is in harmony with the natural environment—meeting the current needs of society without jeopardizing the ability of future generations to meet their needs. Sustainable development means integrating the decision-making process across the project team, so that every decision is made with an eye to the greatest long-term benefits.

The certificate in Sustainability and Green Construction is a flexible, part-time post-baccalaureate program, focused on the sustainable aspects of the construction process. Students have the opportunity to complete all requirements within one and a half years.

Currently, in the Leadership in Energy and Environmental Design (LEED) green building rating system, the construction process represents a significant portion of the effort required to achieve high performance building programs.This certificate program is intended to explore these concepts in detail. Credits from this certificate will transfer toward a Masters of Science in Construction Management (p. 320).

Requirements

CMGT 501	Leadership in Construction	3.0
CMGT 512	Cost Estimating and Bidding Strategies	3.0
CMGT 515	Risk Management in Construction	3.0
CMGT 535	Community Impact Analysis	3.0
CMGT 538	Strategic Management in Construction	3.0
CMGT 545	Sustainable Principles & Practices	3.0
CMGT 546	Sustainable Technologies	3.0
CMGT 547	LEED Concepts	3.0
CMGT 558	Community Sustainability	3.0
Total Credits		**27.0**

Construction Management Faculty

Charles Cook, PhD *(New York University)*. Assistant Clinical Professor. Construction management; project management; leadership and teambuilding; oral and written communication.

Robert Muir Jr.,, PhD *(Drexel University)*. Assistant Clinical Professor. Construction management; value engineering; management of field

operations; planning and scheduling; project management; heavy and industrial construction.

Richard Sievert, PhD *(Northwestern University)*. Associate Clinical Professor. Project management and construction management; value engineering; cost reduction and waste minimization; facilities planning and management; marketing and selling professional services; quality management, engineering and construction business administration.

Engineering Technology

Major: Engineering Technology
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 15.0000
Standard Occupational Classification (SOC) code: 17-3029

About the Program

The Master of Science in Engineering Technology offers courses focused on the technologies used in today's modern emerging industries. The program is designed to provide specialized engineering technology education to those who currently hold an accredited baccalaureate degree in engineering technology or a related field. The flexibility of the program permits students to select a combination of courses relevant to their individual career goals or to provide the foundation for further advanced study. Courses will be delivered in several modes; face-to-face, on-line, or real-time videoconferencing.

The primary goal of the Master of Science in Engineering Technology is to develop advanced-level practitioners in resolving technical problems through the application of engineering principles and technology.

The program can be pursued on a part-time basis and permits students to select a combination of courses relevant to their individual career goals**.** The program is also designed to provide the foundation for further advanced study and allows practicing professionals the opportunity to update knowledge and skills based on the latest technological developments in the industrial environment and therefore advance in their chosen careers.

Program Goals

Graduates of the Master of Science in Engineering Technology will be expected to:

- Apply scientific and technological concepts to solving technological problems.
- Apply concepts and skills developed in a variety of technical and professional disciplines including computer applications and networking, materials properties and production processes, and quality control to improve production processes and techniques.
- Plan, facilitate, and integrate technology and problem solving techniques in the leadership functions of the industrial enterprise system.
- Engage in applied technical research in order to add to the knowledge of the discipline and to solve problems in an industrial environment.
- Apply theories, concepts, and principles of related disciplines to develop the communication skills required for technical-managers.

For additional information, view the College of Engineering's Engineering Technology program (http://drexel.edu/engtech) web page.

Admission Requirements

Applicants must have a 3.0 grade point average in their undergraduate or upper division (junior and senior year) coursework.

International students who have their undergraduate degree from a country whose language is not English can be admitted with a Test of English as a Foreign Language (TOEFL) test score of 550 or better. For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/isss/NewStudent.html) page.

Prerequisite courses
The following prerequisite courses must be completed at the undergraduate level with a minimum grade of C:

- Calculus I
- Calculus II
- Physics I (can be algebra-based)
- Physics II (can be algebra-based)
- DC/AC Circuit Analysis
- Digital Electronics
- Chemistry I or Industrial Materials
- Statistics

Visit the Graduate Admissions (http://www.drexel.edu/grad/programs/coe/engineering-technology) website for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

Candidates for the MS in Engineering Technology must complete a minimum of 45.0 quarter credits. A minimum grade of B is required in all core courses and no more than two C grades in electives.

Of the 45.0 quarter credits required for the degree, 30.0 must be earned at Drexel University, including 24.0 credits of Engineering Technology (ET) courses. A maximum of 15.0 transfer credits may be allowed for graduate courses taken at other institutions, if they are appropriate to the student's plan of study.

Core Courses		
ET 605	Materials for Emerging Technologies	3.0
ET 610	Networks for Industrial Environments	3.0
ET 615	Rapid Prototyping and Product Design	3.0
ET 619	Programmable Devices and Systems	3.0
ET 620	Microsystems and Microfabrication	3.0
ET 725	Sensors and Measurement Systems	3.0
ET 732	Modern Energy Conversion Technologies	3.0
EGMT 571	Managerial Statistics	3.0
EGMT 610	Ethics & Business Practices for Engineers	3.0
Electives		9.0
Select three of the following:		
ET 635	Engineering Quality Methods	
ET 675	Reliability Engineering	
ET 730	Lean Manufacturing Principles	
ET 755	Sustainable and Green Manufacturing	
PROJ 501	Introduction to Project Management	
EGMT 572	Statistical Data Analysis	

SYSE 685	Systems Engineering Management	
Capstone Course		9.0
ET 775	Master's Project and Thesis in Engineering Technology [*]	
Total Credits		**45.0**

[*] This is a three (3) credit course that is repeated three (3) times.

Engineering Technology Faculty

Radian Belu, PhD *(Western Ontario)*. Assistant Professor. Renewable energy, including wind and solar energy; power system analysis and control; numerical electromagnetics; lighting electromagnetics; power system protection; instrumentation; and radar and remote sensing in atmospheric research.

Richard Chiou, PhD *(Georgia Institute of Technology)*. Associate Professor. Green manufacturing, mechatronics, Internet-based robotics and automation, and remote sensors and monitoring.

Yalcin Ertekin, PhD *(University of Missouri-Rolla)*. Associate Clinical Professor. High speed machining with micromachining applications, machining process optimization and condition monitoring using multiple sensors, FEA simulation with 3D solid modeling applications, rapid prototyping and reverse engineering, quality and reliability improvement through statistically designed experiments, neural networks and data mining and Taguchi methods, CNC machine tool calibration characterization of cold fastening, clinching and self-pierced riveting processes, non-invasive surgical tool design, student learning enhancement using online simulation tools.

Vladimir Genis, PhD *(Kiev State University, Ukraine) Program Director, Engineering Technology*. Professor. Ultrasound wave propagation and scattering, ultrasound imaging, electronic instrumentation, piezoelectric transducers, and engineering education. Designed and developed diagnostic and therapeutic equipment for medical applications and electronic systems and techniques for defense-related and industrial applications.

Irina Ciobanescu Husanu, PhD *(Drexel University)*. Assistant Clinical Professor. Microgravity combustion, thermal-fluid science with applications in micro-combustion, fuel cells and research of alternative and green fuels, energy conversion and renewable energy, industrial experience in aerospace engineering areas (theoretical analysis, numerical simulations and experimental investigations), design and testing of propulsion systems, mechanical instrumentation, and developing industrial applications of aircraft engines.

Michael Mauk, PhD, PE *(University of Delaware)*. Assistant Clinical Professor. Rapid prototyping, microfluidics, alternative energy including solar energy and photovoltaics, semiconductor materials science, nanotechnology.

Warren Rosen, PhD *(Temple University)*. Assistant Clinical Professor. Computer networks; optical networks; high-performance switching; lightweight protocols.

Project Management

Major: Project Management
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0

Classification of Instructional Programs (CIP) code: 52.0211
Standard Occupational Classification (SOC) code: 11-9199

About the Program

Modern project management is a field that began in the 1950s in the defense industry. In the 1980s, the field gained critical mass in a broad range of industries, including, but not limited to building/construction, IT/systems development, defense, engineering, film and video, financial services, healthcare, and government contracting. Organizations are using project management concepts, tools, and techniques to achieve their objectives and gain a competitive advantage.

The Master of Science in Project Management, a part-time online program, is designed to equip professionals with the knowledge and skills expected of project managers in any field. The course content is mapped to the internationally-recognized Project Management Institute's (PMI)® A Guide to the Project Management Body of Knowledge (PMBOK® Guide).

For additional information, visit the Master of Science in Project Management (http://drexel.edu/projmgt) page.

Admission Requirements

Recommended Prerequisites

The following undergraduate courses or their equivalent are recommended:

- Financial Accounting Foundations
- Introduction to Finance
- Organizational Behavior
- Introduction to Business Statistics

Admission Requirements

- Completed Application Form
- Bachelor's degree from a regionally accredited institution
- Undergraduate GPA of 3.0 or higher (graduate degree GPAs will be considered along with the undergraduate GPA). Applicants with a cumulative GPA below 3.0 may be considered.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended. Instead of hard copy transcripts, you may email official electronic transcripts issued by a post-secondary institution directly to Drexel University Online (customerservice@drexel.com). All transcripts must be supplied, regardless of the number of credits earned or the type of school attended. If all post-secondary institutions are not listed on the application, and then listed on transcripts received from other institutions, application processing will be delayed until the remaining transcripts are submitted. Use Drexel's Transcript Lookup Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions.
- Two letters of recommendation, professional or academic. Drexel University Online now accepts electronic letters of recommendation (http://www.drexel.edu/apply/recommend). If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal Essay, between 500–750 words, describing your interest in the program. Specifically, discuss the following:

- How the program relates to your current line of work
- How you plan to apply the program to your future goals
- How the program relates to your previous educational activities
- If changing course, why are you moving in a new direction
- Resume
- International Students must submit a TOEFL score of 550 or higher. For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/isss/NewStudent.html) page.
- An interview may be requested.

Visit the Graduate Admissions (http://www.drexel.edu/grad) website for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

The Master of Science in Project Management requires completion of 45 credit hours (quarter) of study. The curriculum includes a core of 10 required courses (30 credits), a culminating capstone project experience integrating the knowledge and skills acquired during the program (PROJ 695 (https://nextcatalog.drexel.edu/graduate/schooloftechnologyandprofessionalstudies/projectmanagement), 3.0 credits) and 12.0 credits of electives.

Electives

Students may use electives to increase project management, creativity, communication, or leadership skills or to develop areas of specialization. Any appropriate graduate course offered in the University can serve as an elective if the student has sufficient background to take the course. In addition, the program will offer its own elective courses including special topics (PROJ 690 (https://nextcatalog.drexel.edu/graduate/schooloftechnologyandprofessionalstudies/projectmanagement)). Qualified students may also pursue independent study (PROJ 699 (https://nextcatalog.drexel.edu/graduate/schooloftechnologyandprofessionalstudies/projectmanagement)) for elective credit in special cases.

Curriculum

Core Courses		
PROJ 501	Introduction to Project Management	3.0
PROJ 502	Project Planning & Scheduling	3.0
PROJ 510	Project Quality Management	3.0
PROJ 515	Project Estimation & Cost Management	3.0
PROJ 520	Project Risk Assessment & Management	3.0
PROJ 530	Managing Multiple Projects	3.0
PROJ 535	International Project Management	3.0
PROJ 540	Project Procurement Management	3.0
PROJ 603	Project Leadership & Teamwork	3.0
PROJ 645	Project Management Tools	3.0
Free Electives		12.0
Capstone Project		
PROJ 695	Capstone Project in Project Management	3.0
Total Credits		**45.0**

Sociology Faculty

Robert J. Brulle, PhD *(George Washington University)*. Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Emmanuel F. Koku, PhD *(University of Toronto)*. Associate Professor. Social network analysis; qualitative/quantitative research; medical sociology; social epidemiology; social demography; sociology of development; communication and information technology; community and urban sociology.

Diamantino Machado, PhD *(Temple University)*. Teaching Professor. Globalization, political economy, political sociology, philosophy of social science, postmodernism and social reflection.

Mimi Sheller, PhD *(New School for Social Research) Director, Center for Mobilities Research and Policy*. Professor. Sustainable mobility and mobility justice: new cultures and infrastructures of travel, transport, mobile communication, and urbanism; Caribbean Studies: history, culture and political theory of the region, including intersections of race, ethnicity, gender, sexuality and class.

Diane Sicotte, PhD *(Arizona State University)*. Associate Professor. Sociology of environmental injustice: inequalities in the citing of environmental hazards; community-based research in neighborhoods dealing with industrial hazards; sociology of the environment; urban sociology; social inequalities.

Interdepartmental Faculty

Mary Ebeling, PhD *(University of Surrey)*. Associate Professor. Science and technology studies; emerging technologies and biocapital; media and democratic cultures; radical social movements; sociology of markets; political sociology; and ethnographic methodologies.

Kelly Joyce, PhD *(Boston College) Director, Master's Program in Science Technology & Society*. Professor. Science, medicine and technology; aging and technology; qualitative social science methods, social theory; healthcare and medicine.

Property Management

Major: Property Management
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.1501
Standard Occupational Classification (SOC) code: 11-9141

About the Program

The only online program of its kind in the nation, Drexel's Master of Science in Property Management prepares graduate students to drive innovation and lead the real estate management industry. Graduates with an MS in Property Management benefit from a transdisciplinary, comprehensive education in the real estate industry. The rigorous curriculum is designed to challenge and engage students. Students have access to courses anytime, anywhere.

The Master of Science in Property Management is a part-time online program with a structured plan of study. The curriculum stresses strategic decision-making, critical thinking, independent research, and analysis and synthesis of issues and concepts from all disciplines associated with the

built environment. Students review case studies, exchange best practices, and discuss the latest industry strategies and benchmarks. All students complete a capstone project which is the major project of a student's master's degree experience.

For additional information, visit the Master of Science in Property Management (http://www.drexel.edu/engmgmt/propmgt/academics/ms) page.

Admission Requirements

- Completed application
- Current resume or CV
- Bachelor's degree from a regionally accredited, top-tier institution
- Undergraduate GPA of 3.0 or higher out of a 4.0 scale
- Applicants with a cumulative Undergraduate GPA below 3.0 with extensive related experience **and** relevant industry credentials (e.g. CPM®) may be considered.
- Graduate degree GPAs will be considered along with the Undergraduate GPA.
- Official transcripts from all universities or colleges and other post-secondary educational institutions attended. Email official electronic transcripts issued by a post-secondary institution directly to Drexel University Online (customerservice@drexel.com). All transcripts must be supplied, regardless of the number of credits earned or the type of school attended. If all post-secondary institutions are not listed on the application, and then listed on transcripts received from other institutions, application processing will be delayed until the remaining transcripts are submitted. Use Drexel's Transcript Lookup Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions.
- Two letters of recommendation, professional or academic. Drexel University Online now accepts electronic letters of recommendation (http://www.drexel.edu/apply/recommend). If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- An essay of at least 1,000 words describing your interest in the program. Your essay should include discussion of the following:
  - The degree's connection to your Bachelor's degree and/or other graduate coursework
  - The extent your past experiences (personal and professional) will enhance your classroom engagement, complement your coursework, and strengthen your performance
  - The program's relationship to current employment and potential for career growth
  - Your plan to apply the degree to future goals
  - If this is a change to your academic plans and/or career, explain the catalyst and your expectations
- International students must submit a TOEFL score indicating a minimum of 600 (paper exam) or 250 (CBT exam). For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/isss/NewStudent.html) page.
- An interview may be requested

Visit the MS in Property Management Online Application (http://www.drexel.com/online-degrees/business-degrees/ms-property-management/apply.aspx) page for more information about requirements and deadlines, as well as instructions for applying online.

Degree Requirements

Required Core Courses

PROJ 501	Introduction to Project Management	3.0
BUSN 502	Essentials of Economics	3.0
STAT 601	Business Statistics	3.0
PRMT 603	Property Asset Management	3.0
PRMT 610	Facilities Management	3.0
PRMT 625	Property Financial Analysis & Strategies	3.0
PRMT 640	Property Security Emergency & Risk Management	3.0
PRMT 645	Property Management Technology Strategies	3.0
REAL 568	Real Estate Development	3.0
REAL 572	Advanced Market Research & Analysis	3.0
REAL 574	Real Estate Economics in Urban Markets	3.0
REAL 575	Real Estate Finance	3.0
Electives		
Select Two (2) Courses From the Following:		6.0
BUSN 501	Measuring and Maximizing Financial Performance	
STAT 632	Datamining for Managers	
REAL 576	Real Estate Valuation & Analysis	
REAL 577	Legal Issues in Real Estate Development	
CMGT 558	Community Sustainability	
PRMT T680	Special Topics in PRMT	
Capstone in Property Management		
PRMT 695	Capstone in Property Management I	3.0
Total Credits		**45.0**

Politics Faculty

Scott Barclay, PhD *(Northwestern University) Department Head, Politics.* Professor. Judicial systems, civil rights, public policy and administration.

Zoltan Buzas, PhD *(Ohio State University).* Post-Doctoral Fellow. International relations theory, international security, race and politics, diplomatic history.

George Ciccariello-Maher, PhD *(University of California, Berkeley).* Assistant Professor. Colonialism, social movements, political theory.

Rose Corrigan, PhD *(Rutgers University).* Associate Professor. Women, public law, American politics and policy.

Richardson Dilworth, PhD *(Johns Hopkins University) Director, Center for Public Policy.* Associate Professor. American political development, urban politics, public policy.

Erin R. Graham, PhD *(Ohio State University).* Assistant Professor. International institutions, international relations theory, global environmental politics.

Amelia Hoover Green, PhD *(Yale University).* Assistant Professor. Dynamics of conflict-related violence; intra-armed group politics and socialization; statistics in human rights.

Christian Hunold, PhD *(University of Pittsburgh).* Associate Professor. Environmental policy; comparative politics; political theory.

Alison Kenner, PhD *(Rensselaer Polytechnic Institute)*. Assistant Professor. Science, technology, and health; environmental health problems; cities and place; feminist theory; medical anthropology; digital humanities

Julie Mostov, PhD *(New York University) Vice Provost for Global Initiatives*. Professor. Modern political thought, democratic theory, nationalism, gender studies, South Eastern Europe and the Balkans.

Gwen Ottinger, PhD *(University of California, Berkeley)*. Assistant Professor. Social studies of science and technology, environmental justice, science and engineering ethics, environmental ethics.

William L. Rosenberg, PhD *(Temple University)*. Professor. Behavioral politics, public opinion, and political communication.

Chloe Silverman, PhD *(University of Pennsylvania)*. Associate Professor. Parent advocacy for autism and pollinator health research.

Interdepartmental Faculty

Joel E. Oestreich, PhD *(Brown University) Director of International Area Studies*. Associate Professor. International organizations, international finance, development, and human rights.

Emeritus Faculty

Richard L. Rosen, PhD *(Case Western Reserve University)*. Associate Professor Emeritus. History of science, appropriate technology, and world history.

Michael J. Sullivan, PhD *(University of Virginia)*. Professor Emeritus. Comparative politics and developing nations.

Systems Engineering

Major: Systems Engineering
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 14.2701
Standard Occupational Classification (SOC) code: 17-2199

About the Program

The Master of Science in Systems Engineering is an online curriculum integrating systems and financial management and planning.The degree enables engineering leaders to perform, lead, and manage systems development throughout the life cycle, from conceptual development and engineering design through the operation and sustainment phases.

Elective courses for the curriculum:

- Include models relevant to sustainable, high performance systems and topics related to living, learning, effectiveness, power, influence, networking, and systems thinking as they relate to effective systems engineering
- Expose students to model-based system development using SysML and DODAF, also covering major aspects of the systems domain.
- Teach SE processes and skills to integrate user needs, manage requirements, conduct technological evaluation, and build elaborate system architectures, assess risk and establish financial and schedule constraints.

- Prepare students to intelligently manage and contribute to any engineering challenge, from concept development, technology assessment, and architecture selection, to proposal development, stimulating and challenging as they consider sustainability-oriented projects and become serious systems engineering managers and practitioners.

Program Outcomes

Graduates of the Drexel University Master of Science in Systems Engineering will be competent in their ability to:

- develop and implement models and tools to enhance and optimize complex systems;
- develop and manage processes relevant to complex systems development;
- architect, design, implement, integrate, verify, validate, support and decommission complex systems;
- use systems engineering tools and practices to identify and execute effective technical solutions;
- manage system-intensive projects within cost and schedule constraints;
- consider financial elements in all complex systems solutions.

Certificate Opportunity

A student may first complete a Certificate as an individual pursuit or as a gateway to the full Master of Science in Systems Engineering. A student may apply for admission to the Masters of Science in Systems Engineering degree program at any point in a certificate series. Upon admission, graduate courses successfully completed in the certificate series may be applied toward the Master's degree as applicable. Certificate opportunities include:

- Certificate in Systems Design and Development (p. 328)
- Certificate in Systems Engineering Analysis (p. 329)
- Certificate in Systems Engineering Fundamentals (p. 329)
- Certificate in Systems Engineering Integrated Logistics (p. 330)
- Certificate in Systems Reliability Engineering (p. 330)

Admission Requirements

Degree and GPA Requirement

A bachelor's degree in an Engineering discipline from an ABET-accredited college or university is required. A bachelor's degree in science (Physics, Mathematics, Computer Science, etc.) can also acceptable. Applicants with degrees in sciences may be required to take a number of undergraduate or post-baccalaureate courses. An undergraduate degree earned abroad must be deemed equivalent to a U.S. bachelor's degree. A minimum 3.0 GPA (on a 4.0 scale) for a bachelor's degree as well as for any subsequent graduate-level work is required.

GRE Requirement

The GRE General Test is only required of applicants for full-time studies; part-time applicants do not need to take the GRE. For those taking the GRE, a minimum score of approximately 1200 is recommended. Official documents of the exam must be submitted directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted. The GRE can be waived for students who have successfully completed a Master's degree or a Drexel certificate in the systems curriculum.

TOEFL Requirement

For students whose native language is not English and who do not hold a degree from a U.S.institution, the Test of English as a Foreign Language (TOEFL) is required. TOEFL scores must be less than two years old to be considered. Minimum of 600 (paper-based), 250 (computer-based), or 100 (internet-based). Official documents of this exam must be submitted directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted.

Other Requirements

- Submission of an application
- Official, sealed college transcripts
- An essay
- Two or more letters of recommendation

Degree Requirements

The master of science in systems engineering degree requires 48.0 credits, including 36.0 credits in required core courses and 12.0 graduate elective credits. These electives may be taken in other colleges at Drexel consistent with the plan of study and any required prerequisites.

Students may take their required elective credits from any graduate-level course(s) in engineering, business, or another college for which they have adequate preparation and can obtain approvals from the college and the systems engineering program.

All candidates are encouraged to discuss areas of interest with the program advisor and to develop a proposed plan of study during the early stages of the program.
Note: Specific course requirements will be waived for students who have taken equivalent courses elsewhere.

Engineering Management Required Courses

EGMT 531	Engineering Economic Evaluation & Analysis	3.0
EGMT 571	Managerial Statistics	3.0
EGMT 572	Statistical Data Analysis	3.0
EGMT 573	Operations Research	3.0
EGMT 685	Systems Engineering Management	3.0

Systems Engineering Required Courses

EGMT 688	Systems Engineering Analysis I	3.0
EGMT 690	Systems Engineering Analysis II	3.0
SYSE 510	Systems Engineering Process	3.0
SYSE 520	Sustainment and Integrated Logistics	3.0
SYSE 521	Integrated Risk Management	3.0
SYSE 533	Systems Integration and Test	3.0

Capstone in Systems Engineering

| SYSE 598 | Capstone in Systems Engineering | 3.0 |

| **Electives** | | 12.0 |

Complete four of the following:

SYSE 511	Systems Engineering Tools	
SYSE 522	Supply Chain Systems Engineering	
SYSE 523	Systems Reliability Engineering	
SYSE 524	Systems Reliability, Availability & Maintainability Analysis	
SYSE 525	Statistical Modeling & Experimental Design	
SYSE 530	Systems Engineering Design	
SYSE 531	Systems Architecture Development	
SYSE 532	Software Systems Engineering	
EGMT 635	Visual System Mapping	
EGMT 650	Engineering Leadership	
ECES 511	Fundamentals of Systems I	
ECES 512	Fundamentals of Systems II	
ECES 513	Fundamentals of Systems III	
ECES 521	Probability & Random Variables	
ECES 522	Random Process & Spectral Analysis	
ECES 523	Detection & Estimation Theory	
ECES 811	Optimization Methods for Engineering Design	
ECEP 501	Power System Analysis	
ECEP 502	Computer Analysis of Power Systems	
ECEP 503	Synchronous Machine Modeling	
ECEP 610	Power System Dynamics	
ECEP 611	Power System Security	
ECEP 612	Economic Operation of Power Systems	
SYSE 898	Master's Thesis in Systems Engineering [**]	
Total Credits		**48.0**

*   Electives from other engineering disciplines and/or Drexel colleges may be considered with review and approval by the advisor.

** If a student decides to pursue the Master's Thesis option, the student will complete the 12 core courses, one elective course and nine thesis credits. Advisor/Director consultation and approval is required if a student is interested in waiving core courses when pursuing the Master's Thesis option.

Dual Degree Opportunity

Students may pursue the Master of Science in Systems Engineering as part of a dual degree option with approval from the graduate advisors of both programs. Students may transfer as many as 15 credits from one program to the other, usually in the form of electives, and are therefore required to complete a minimum of 63 graduate credits in order to complete a dual master's degree program (the actual credit total may be higher, depending on each department's core requirements). Examples of permissible dual pursuits could include MS SYSE/MS EE and MS SYSE/ MS Finance.

Secondary Master's Degree Pursuit Opportunity

Students with a previously completed master's degree may pursue a second master's degree in a different major without the need to go through the admission process again or to complete another 45 credits of graduate coursework. Because the student has already completed a master's degree at Drexel, he or she may transfer up to 15 credits from the first into the second master's degree program, depending upon, departmental requirements in the new major, and may, therefore, complete the second master's degree with a minimum of 33 new graduate credits.

Readmission into the second master's degree program is requested through the new departmental graduate advisor, with final approval by the Graduate Studies Office. During the term in which the student expects to complete the second master's degree, he/she must file an application for degree form through DrexelOne.

Career Opportunities

The MS Systems Engineering prepares students to become effective systems engineers, leaders, managers and future executives. With a systems engineering background, students are able to tackle a wide array of engineering challenges from the entire systems life cycle, including concept development, technology assessment, architecture selection, and proposal development.

Systems engineers are highly valued in industry because their skills complement those in traditional engineering fields. Whereas other engineering disciplines usually focus deeply in only one area, systems engineers must integrate all of those areas into a comprehensive and effective system. This is a versatile skill-set that allows for a flexible career path, as systems engineering expertise is sought by a wide range of industries such as healthcare, defense, communications, aerospace, government, transportation, finance, and more. Drexel University's MS Systems Engineering will prepare students from any of these fields to lead large, complex projects in their organizations.

Anthropology Faculty

Anthony Glascock, PhD *(University of Pittsburgh) Coordinator of the Anthropology Program.* Professor. Aging and health, definitions of functionality and impairment, technology and aging, social organization, Ireland, East Africa.

Barbara Hornum, PhD *(Bryn Mawr College) Director of Center for Academic Excellence (DCAE).* Associate Professor. Comparative gerontology, planned communities, continuing care communities, retirement, faculty development.

David Kutzik, PhD *(Temple University).* Professor. Sociology and philosophy of science; applied gerontological research; political economy of health care; microprocessor-based assistive technologies to improve case management and increase independent living among frail populations.

Brent Luvaas, PhD *(UCLA).* Assistant Professor. DIY and independent media production; transnational consumer culture; popular music; new media and mediated subjectivities; youth culture in the US and Indonesia.

Usha Menon, PhD *(University of Chicago).* Associate Professor. Self, identity & personhood, emotional functioning, Hindu morality, gender relations in Hindu society, adult development, popular Hinduism, post-colonial feminism, Hindu religious nationalism and Islamic radicalism.

Rakhmiel Peltz, PhD *(Columbia University, Linguistics; University of Pennsylvania, Biological Sciences) Director of Judaic Studies Program.* Professor. Sociolinguistics, ethnography of communication, social history of Yiddish language and culture, Yiddish culture of Eastern Europe, language planning, language and ethnic identity, language and group memory, aging and ethnicity, history of urban neighbors.

Douglas V. Porpora, PhD *(Temple University).* Professor. International political economy, culture, social theory, and philosophy of social science.

Robert Powell, PhD *(Temple University).* Assistant Teaching Professor. Early and Middle Bronze Age Crete; archaeoastronomy; early state formation; archaeology and anthropology of frontiers; mass communication.

Rachel R. Reynolds, PhD *(University of Illinois at Chicago).* Associate Professor. Sociolinguistics, ethnography of communication, intercultural communication, globalization and the rhetoric of community, political economy of immigration, race and ethnicity, new African immigrants in the United States, Igbo studies.

Wesley Shumar, PhD *(Temple University) Department Head, Anthropology.* Professor. Ethnography of cyberspace, online learning communities, political economy of higher education, globalization, activity theory, semiotics, critical realism, psychoanalysis, identity and the self.

Judith Storniolo, PhD *(University of Pennsylvania).* Teaching Professor. Historical and comparative linguistics, Mesoamerican languages and culture, applied anthropology, public policy, oral traditions and narratives, ideology and ritual, Mesoamerican ethnohistory; and pre-Columbian literature.

Certificate in Systems Design and Development

Certificate Level: Graduate
Admission Requirements: Bachelor's degree in engineering or other science
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 14.2701
Standard Occupational Classification (SOC) Code: 17-2199

About the Program

The courses in this certificate focus on teaching students engineering design and management of large complex systems including software intensive systems. These courses will expose the students to the systems engineering design body of knowledge and allow them to develop systems skills in stimulating and challenging environments that will prepare them to be industry leaders who can make a significant difference. Upon completion of this certificate the students will be able to design, lead and manage any systems engineering effort regardless of size, complexity, technologies, or engineering emphasis.

Admission Requirements
Degree and GPA Requirement

A bachelor's degree in an engineering discipline from an ABET-accredited college or university is required. A bachelor's degree in the sciences (physics, mathematics, computer science, etc.) may also be acceptable. Applicants with degrees in the sciences may be required to take a number of undergraduate or post-baccalaureate courses. An undergraduate degree earned abroad must be deemed equivalent to a US bachelor's degree. A minimum 3.0 GPA (on a 4.0 scale) for a bachelor's degree as well as for any subsequent graduate-level work is required.

TOEFL Requirement

For students whose native language is not English and who do not hold a degree from a US institution, the Test of English as a Foreign Language (TOEFL) is required. TOEFL scores must be less than two years old to be considered. Minimum of 600 (paper-based), 250 (computer-based) or 100 (internet-based). Official documents of this exam must be submitted

directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted.

Other Requirements

- Submission of an application
- Official, sealed college transcripts
- An essay
- Two or more letters of recommendation

Requirements

EGMT 685	Systems Engineering Management	3.0
EGMT 688	Systems Engineering Analysis I	3.0
SYSE 530	Systems Engineering Design	3.0
SYSE 531	Systems Architecture Development	3.0
SYSE 532	Software Systems Engineering	3.0
Total Credits		**15.0**

Certificate in Systems Engineering Analysis

Certificate Level: Graduate
Admission Requirements: Bachelor's degree in engineering or other science
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 15.1501
Standard Occupational Classification (SOC) Code: 11-9041

About the Program

This courses in this certificate focus on teaching students statistical analysis and the use of mathematical models to solve a variety of problems. The courses are structured to discuss theory, process and application. The primary emphasis is application as the objectives of the courses are to provide students with skills to model problems, determine a quantitative solution and to perform sensitivity analysis. Theory and process are also studied so students learn how the models work by understanding the underlying theory associated with a particular model. Understanding of theory also enforces skills to conduct sensitivity analysis and helps answer "what if" type questions. Upon successful completion of this certificate, students will be able to formulate mathematical models and solve quantitative problems.

Any students interested in decision sciences or advanced mathematical modeling and analysis should consider pursuing this certification.

Admission Requirements

Degree and GPA Requirement

A bachelor's degree in an engineering discipline from an ABET-accredited college or university is required. A bachelor's degree in the sciences (physics, mathematics, computer science, etc.) may also be acceptable. Applicants with degrees in the sciences may be required to take a number of undergraduate or post-baccalaureate courses. An undergraduate degree earned abroad must be deemed equivalent to a US bachelor's

degree. A minimum 3.0 GPA (on a 4.0 scale) for a bachelor's degree as well as for any subsequent graduate-level work is required.

TOEFL Requirement

For students whose native language is not English and who do not hold a degree from a US institution, the Test of English as a Foreign Language (TOEFL) is required. TOEFL scores must be less than two years old to be considered. Minimum of 600 (paper-based), 250 (computer-based) or 100 (internet-based). Official documents of this exam must be submitted directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted.

Other Requirements

- Submission of an application
- Official, sealed college transcripts
- An essay
- Two or more letters of recommendation

Requirements

EGMT 571	Managerial Statistics	3.0
EGMT 572	Statistical Data Analysis	3.0
EGMT 573	Operations Research	3.0
EGMT 690	Systems Engineering Analysis II	3.0
SYSE 525	Statistical Modeling & Experimental Design	3.0
Total Credits		**15.0**

Certificate in Systems Engineering Fundamentals

Certificate Level: Graduate
Admission Requirements: Bachelor's degree in engineering or other science
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 14.2701
Standard Occupational Classification (SOC) Code: 17-2199

About the Program

This certificate focuses on teaching students the process and the art of systems engineering. Students will learn systems engineering tools and skills to integrate user needs, manage requirements, conduct technological evaluation and build elaborate system architectures. The courses devote particular attention to knowledge, skills, mindset and leadership qualities needed to be a successful systems engineering leader in the field.

Any students working or interested in the field of systems engineering should consider pursuing and completing this certificate.

Admission Requirements

Degree and GPA Requirement

A bachelor's degree in an engineering discipline from an ABET-accredited college or university is required. A bachelor's degree in the sciences (physics, mathematics, computer science, etc.) may also be acceptable. Applicants with degrees in the sciences may be required to take a number of undergraduate or post-baccalaureate courses. An undergraduate degree earned abroad must be deemed equivalent to a US bachelor's degree. A minimum 3.0 GPA (on a 4.0 scale) for a bachelor's degree as well as for any subsequent graduate-level work is required.

TOEFL Requirement

For students whose native language is not English and who do not hold a degree from a US institution, the Test of English as a Foreign Language (TOEFL) is required. TOEFL scores must be less than two years old to be considered. Minimum of 600 (paper-based), 250 (computer-based) or 100 (internet-based). Official documents of this exam must be submitted directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted.

Other Requirements

- Submission of an application
- Official, sealed college transcripts
- An essay
- Two or more letters of recommendation

Requirements

EGMT 571	Managerial Statistics	3.0
EGMT 572	Statistical Data Analysis	3.0
EGMT 573	Operations Research	3.0
EGMT 685	Systems Engineering Management	3.0
EGMT 688	Systems Engineering Analysis I	3.0
EGMT 690	Systems Engineering Analysis II	3.0
Total Credits		**18.0**

Certificate in Systems Engineering Integrated Logistics

Certificate Level: Graduate
Admission Requirements: Bachelor's degree in engineering or other science
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 14.2701
Standard Occupational Classification (SOC) Code: 17-2199

About the Program

The courses in this certificate focus on teaching students to understand, analyze and enhance the performance of complex and dynamic global supply chains. The certificate is structured with three quantitative courses: EGMT 571, EGMT 572, and EGMT 573, that will provide the students with mathematical and statistical tools to analyze and evaluate the supply chain.

In addition, the certificate offers three courses: SYSE 520, SYSE 522 SYSE 690 and that will allow the students to understand the dynamic

and complex nature of global supply chains from a systems engineering perspective, as well as to implement the quantitative tools learned during the first three courses to efficiently manage the supply chain. Students will evaluate and analyze diverse types of supply chains through case studies, and analyze and discuss the best practices in supply chains across the world.

All affiliate courses may be applied to the Master of Science in Systems Engineering (p. 326) and the Master of Science in Engineering Management (p. 314).

Admission Requirements

Degree and GPA Requirement

A bachelor's degree in an engineering discipline from an ABET-accredited college or university is required. A bachelor's degree in the sciences (physics, mathematics, computer science, etc.) may also be acceptable. Applicants with degrees in the sciences may be required to take a number of undergraduate or post-baccalaureate courses. An undergraduate degree earned abroad must be deemed equivalent to a US bachelor's degree. A minimum 3.0 GPA (on a 4.0 scale) for a bachelor's degree as well as for any subsequent graduate-level work is required.

TOEFL Requirement

For students whose native language is not English and who do not hold a degree from a US institution, the Test of English as a Foreign Language (TOEFL) is required. TOEFL scores must be less than two years old to be considered. Minimum of 600 (paper-based), 250 (computer-based) or 100 (internet-based). Official documents of this exam must be submitted directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted.

Other Requirements

- Submission of an application
- Official, sealed college transcripts
- An essay
- Two or more letters of recommendation

Requirements

EGMT 571	Managerial Statistics	3.0
EGMT 572	Statistical Data Analysis	3.0
EGMT 573	Operations Research	3.0
EGMT 690	Systems Engineering Analysis II	3.0
SYSE 520	Sustainment and Integrated Logistics	3.0
SYSE 522	Supply Chain Systems Engineering	3.0
Total Credits		**18.0**

Certificate in Systems Reliability Engineering

Certificate Level: Graduate
Admission Requirements: Bachelor's degree in engineering or other science
Certificate Type: Graduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 14.2701
Standard Occupational Classification (SOC) Code: 17-2199

About the Program

The courses in this certificate focus on teaching students to design for sustainability and reliability of systems during the life cycle of operation. Students will take the first three courses that will teach them the analytical tools required to perform reliability and maintainability modeling and analysis. Then, the students will take three courses that focus on systems reliability, maintainability and availability analysis (RM&A) for systems. The courses have an application to all phases of the systems engineering process including requirements definition through systems design and development. The students will learn the process that starts with RM&A in the initial phases of development, conducting trade off analysis during the system development phase to optimize reliability and availability of the system. The students will also learn to improve the reliability and availability of a product or a system by modeling and analysis of systems reliability using probability models.

Upon completion of the courses, students will be able to understand RM&A and modeling, apply reliability models for a product or system during its life-cycle: design, production, and warranty, as well as how to conduct trade off analysis to enhance availability and reliability of the system and development of maintenance concepts that are cost effective and support sustainment of the system.

Admission Requirements

Degree and GPA Requirement

A bachelor's degree in an engineering discipline from an ABET-accredited college or university is required. A bachelor's degree in the sciences (physics, mathematics, computer science, etc.) may also be acceptable. Applicants with degrees in the sciences may be required to take a number of undergraduate or post-baccalaureate courses. An undergraduate degree earned abroad must be deemed equivalent to a US bachelor's degree. A minimum 3.0 GPA (on a 4.0 scale) for a bachelor's degree as well as for any subsequent graduate-level work is required.

TOEFL Requirement

For students whose native language is not English and who do not hold a degree from a US institution, the Test of English as a Foreign Language (TOEFL) is required. TOEFL scores must be less than two years old to be considered. Minimum of 600 (paper-based), 250 (computer-based) or 100 (internet-based). Official documents of this exam must be submitted directly to the Graduate Admissions Office. Unofficial photocopies will not be accepted.

Other Requirements

- Submission of an application
- Official, sealed college transcripts
- An essay
- Two or more letters of recommendation

Requirements

EGMT 571	Managerial Statistics	3.0
EGMT 572	Statistical Data Analysis	3.0
EGMT 573	Operations Research	3.0
EGMT 688	Systems Engineering Analysis I	3.0

SYSE 523	Systems Reliability Engineering	3.0
SYSE 524	Systems Reliability, Availability & Maintainability Analysis	3.0
Total Credits		**18.0**

Materials Science and Engineering

Major: Materials Science and Engineering
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS); 90.0 (PhD)
Classification of Instructional Programs (CIP) code:
Standard Occupational Classification (SOC) code:

About the Program

The graduate program in Materials Science and Engineering aims to provide an education which encompasses both the breadth and depth of the most recent knowledge base in the materials science and engineering fields in a format suitable for individuals seeking careers in academia and/or industry.

In addition, the program provides students with research training through their courses and thesis research at the MS and PhD levels.

The graduate student body reflects a broad spectrum of undergraduate backgrounds. Because of the expansion into interdisciplinary areas, qualified physical and biological science graduates may also join the program. Non-engineering graduates are required to take MATE 503-Introduction to Materials Engineering.

Graduate work in materials science and engineering is offered both on a regular full-time and on a part-time basis. The General (Aptitude) Test of the Graduate Record Examination (GRE) is required for applicants pursuing full-time study.

Career Opportunities

Graduates go on to careers in engineering firms, consulting firms, law firms, private industry, business, research laboratories, academia, and national laboratories. Materials scientists and materials engineers find employment in such organizations as Hewlett-Packard, Intel, IBM, 3M, DuPont, Lockheed-Martin, Johnson and Johnson, Merck, AstraZeneca, Arkema, Army Research Laboratory, Los Alamos National Laboratory, Air Products, Micron, Xerox, Motorola, Monsanto, Corning, and Eastman Kodak.

For more information about Materials Science and Engineering, visit the Department of Materials Science and Engineering (http://www.materials.drexel.edu) web page.

Admission Requirements

Applicants must meet the graduate requirements for admission to Drexel University. The graduate student body reflects a broad spectrum of undergraduate backgrounds. Because of the expansion into interdisciplinary areas, qualified non-MSE engineering, physical and biological science graduates may also join the program.

For specific information on how to apply to this program, visit Drexel University's Materials Science and Engineering Graduate Admissions

(http://www.drexel.edu/grad/programs/coe/materials-science-engineering) page.

Master of Science in Materials Science and Engineering

The 45.0 quarter credits required for the MS degree include two required core courses on MATE 510-Thermodynamics of Solids and MATE 512-Introduction to Solid State Materials. Students choose four additional core courses.

Thesis Options

All full-time students are required to undertake a 9.0 credit thesis on a topic of materials research supervised by a faculty member. MS students can select the Non-thesis Option if carrying out research is not possible, in which case, the thesis may be replaced by either (a) a 6.0 credit Thesis Proposal and 3.0 credit coursework, or (b) 9.0 credits of coursework.

All students are required, during their first year, to propose an advisor supported research thesis topic or literature survey for approval by the department. Students are urged to make a choice of topic as early as possible and to choose appropriate graduate courses in consultation with their advisor.

The program is organized so that part-time students may complete the degree requirements in two to four years. Full-time students may complete the program in two years.

MS to PhD Program

There is no general exam required for MS students. If an MS student wishes to continue for a PhD then: (a) the student must be admitted to the PhD program (there is no guarantee that an MS student will be admitted to the PhD program), and (b) the student must take the Candidacy Exam during the first term after being admitted to the PhD program.

Materials Science and Engineering (MSMSE) Core Courses [*]

Required core courses:		
MATE 510	Thermodynamics of Solids	3.0
MATE 512	Introduction to Solid State Materials	3.0
Select four additional core courses from the following:		12.0
MATE 501	Structure and Properties of Polymers	
MATE 507	Kinetics	
MATE 515	Experimental Technique in Materials	
MATE 535	Numerical Engineering Methods	
MATE 610	Mechanical Behavior of Solids	
MATE 661	Biomedical Materials I	
Any additional related courses if approved by the graduate advisor/ thesis advisor (such as MATE 514 and MATE 573)		
Optional Core Courses [**]		18.0
Thesis and Alternatives		9.0
9.0 credits MS thesis OR 6.0 credits of thesis proposal (literature review) + 3.0 credit course OR 9.0 credits of electives		
Total Credits		**45.0**

[*]   PhD candidates must achieve a minimum B- grade in each of the core courses. Waiver of any of the 6 core courses must be approved by the MSE Department Graduate Advisor and the student's Thesis Advisor in Advance.

[**]   Of the 18 technical elective credits, at least 9 credits must be taken as Materials Science and Engineering (MATE) courses, while the rest may be taken within the College of Engineering, College of Arts and Sciences, or at other colleges if consistent with the student's plan of study (and given advance written approval by his/her advisor). At least 9 of these 18 technical electives must be exclusive of independent study courses or research credits.

PhD in Materials Science and Engineering Curriculum

A student must have at least the required 90 quarter credits for the PhD degree. An MS degree *is not* a prerequisite for the PhD degree, but can count for 45 quarter credits if the courses are approved by the Graduate Advisor. For students without an MS degree, but with previous graduate course work, they may transfer no more than 15 credits (equivalent to 12 semester-credits) from approved institutions, provided they follow the rules and regulations described in the Materials Requirements of Graduate Degrees (http://mse.drexel.edu/media/49885/mse-graduate-program.pdf).

The required 90 credits for a PhD degree are tabulated below:

- Required Core Courses: 6.0 credits
- Additional Required Courses: 7.0 credits (MATE 504 & MATE 536 (1credit for first 6 terms)
- Selected Core Courses: 12.0 credits
- Optional Courses: 9 credits
- Research or additional option courses: 47 credits
- Dissertation: 9.0 credits (MATE 998)
  Total: 90.0 credits

Required Core Courses: [*]		
MATE 510	Thermodynamics of Solids	3.0
MATE 512	Introduction to Solid State Materials	3.0
Additional Required Courses:		7.0
MATE 504	The Art of Being a Scientist	1.0
MATE 536	Materials Seminar Series	6.0
Selected Core Courses: Choose 4 [*]		
MATE 501	Structure and Properties of Polymers	3.0
MATE 507	Kinetics	3.0
MATE 514	Structure, Symmetry, and Properties of Materials	3.0
MATE 515	Experimental Technique in Materials	3.0
MATE 535	Numerical Engineering Methods	3.0
MATE 610	Mechanical Behavior of Solids	3.0
MATE 661	Biomedical Materials I	3.0
Related courses as approved by the Graduate Advisor/Thesis Advisor		
Optional Courses:		53.0
MATE 541	Introduction to Transmission Electron Microscopy and Related Techniques	3.0
MATE 542	Nuclear Fuel Cycle & Materials	3.0
MATE 543	Thermal Spray Technology	3.0
MATE 544	Nanostructured Polymeric Materials	3.0
MATE 563	Ceramics	3.0
MATE 572	Materials for High Temperature and Energy	3.0

MATE 573	Electronic, Magnetic and Optical Characterization of Energy Materials	3.0
MATE 576	Recycling of Materials	3.0
MATE T580	Special Topics in MATE	3.0
MATE 582	Materials for Energy Storage	3.0
MATE 583	Environmental Effects on Materials	3.0
MATE 585	Nanostructured Carbon Materials	3.0
MATE 602	Soft Materials	3.0
MATE 702	Natural Polymers	3.0
MATE 897	Research	1.0-12.0
Other MSE courses that may be available		

Out-of-department courses, as approved by the Graduate Advisor/ Thesis Advisor

* PhD students must achieve a minimum "B" grade in each of the core courses. Waiver of any of the six (6) core courses must be approved by the MSE Department Graduate Advisor and the student's Thesis Advisor in advance. MATE 536 is a 1.0 credit course that must be repeated 6 times.

An introductory course, MATE 503, is required for students without an undergraduate materials science and engineering degree.

Additional courses are encouraged for students entering the department with an MS degree. Students entering the department at the BS level must satisfy the course requirements for the MS degree. Students choose a doctoral thesis topic after consultation with the faculty. Students are required to consider topics early in the program. An oral thesis presentation and defense are scheduled at the completion of the thesis work.

In addition to the graduate seminar, which is required of all graduate students, doctoral program students must pass an oral candidacy examination and an original proposal defense. The exam is designed to improve and assess the communication skills and the analytical abilities of the student. The following procedures should be followed to complete the PhD.

Candidacy Exam Requirement

All MSE PhD students are required to take the PhD Candidacy Examinations administered by the MSE Department.

For more information, visit the Department of Materials Science and Engineering (http://www.materials.drexel.edu) web page.

Facilities

Biomaterials and Biosurfaces Laboratory
This laboratory contains 10 kN biaxial and 5 kN uniaxial servo-hydraulic mechanical testing machines, a Fluoroscan X-ray system, a microscopic imaging system, a spectra fluorometer, a table autoclave, centrifuge, vacuum oven, CO_2 incubators, biological safety cabinet, thermostatic water baths, precision balance and ultrasonic sterilizer.

Nanobiomaterials and Cell Engineering Laboratory
This laboratory contains fume hood with vacuum/gas dual manifold, vacuum pump and rotary evaporator for general organic/polymer synthesis; gel electrophoresis and electroblotting for protein characterization; bath sonicator, glass homogenizer and mini-extruder for

nanoparticle preparation; centrifuge; ultrapure water conditioning system; precision balance; pH meter and shaker.

Ceramics Processing Laboratory
This laboratory contains a photo-resist spinner, impedance analyzer, Zeta potential meter, spectrofluorometer, piezoelectric d33 meter, wire-bonder, and laser displacement meter.

Dynamic Characterization Laboratory
This laboratory contains metallographic sample preparation (sectioning, mounting and polishing) facilities; inverted metallograph; microhardness tester; automated electropolishing for bulk and TEM sample preparation; SEM tensile stage for EBSD; magneto-optical Kerr effect (MOKE) magnetometer.

MAX Phase Ceramics Processing Laboratory
This laboratory contains a vacuum hot-press; cold isostatic press (CIP) and hot isostatic press (HIP) for materials consolidation and synthesis; precision dilatometer; laser scattering particle size analyzer; impedance analyzer, creep testers, and assorted high temperature furnaces.

Mechanical Testing Laboratory
This laboratory contains mechanical and closed-loop servo-hydraulic testing machines, hardness testers, impact testers, equipment for fatigue testing, metallographic preparation facilities and a rolling mill with twin 6" diameter rolls.

Mesoscale Materials Laboratory
This laboratory contains instrumentation for growth, characterization, device fabrication, and design and simulation of electronic, dielectric, ferroelectric and photonic materials. Resources include physical and chemical vapor deposition and thermal and plasma processing of thin films, including oxides and metals, and semiconductor nanowire growth. Facilities include pulsed laser deposition, atomic layer deposition, chemical vapor deposition, sublimation growth, and resistive thermal evaporation. Variable-temperature high-vacuum probe station and optical cryostats including high magnetic field, fixed and tunable-wavelength laser sources, several monochromators for luminescence and Raman scattering spectroscopies, scanning electron microscopy with electron beam lithography, and a scanning probe microscope.

Nanomaterials Laboratory
This laboratory contains instrumentation for testing and manipulation of materials under microscope, high-temperature autoclaves, Sievert's apparatus; glove-box; high-temperature vacuum and other furnaces for the synthesis of nano-carbon coatings and nanotubes; electro-spinning system for producing nano-fibers.

Oxide Films and Interfaces Laboratory
This laboratory contains an oxide molecular beam epitaxy (MBE) thin film deposition system; physical properties measurement system for electronic transport and magnetometry measurements from 2 – 400K, up to 9 T fields; 2 tube furnaces.

Powder Processing Laboratory
This laboratory contains vee blenders, ball-mills, sieve shaker + sieves for powder classification, several furnaces (including one with controlled atmosphere capability); and a 60-ton Baldwin press for powder compaction.

Soft Matter Research and Polymer Processing Laboratories
These laboratories contain computerized thermal analysis facilities including differential scanning calorimeters (DSC), dynamic mechanical analyzer (DMA) and thermo-gravimetric analyzer (TGA); single-fiber tensile tester; strip biaxial tensile tester; vacuum evaporator; spincoater;

centrifuge; optical microscope with hot stage; liquid crystal tester; microbalance; ultrasonic cleaner; laser holographic fabrication system; polymer injection molder and single screw extruder.

Natural Polymers and Photonics Laboratory

This laboratory contains a spectroscopic ellipsometer for film characterization; high purity liquid chromatography (HPLC) system; lyophilizer; centrifuge; refractometer; electro-spinning system for producing nano-fibers.

X-ray Tomography Laboratory

This laboratory contains a high resolution X-ray tomography instrument and a cluster of computers for 3D microstructure reconstruction; mechanical stage, a positioning stage and a cryostage for in-situ testing. For more information on departmental facilities, please visit the Department's Facilities web page (http://www.materials.drexel.edu/research/facilities).

Centralized Research Facilities

The Department of Materials Science & Engineering relies on Core Facilities within the University for materials characterization and micro- and nano-fabrication. These facilities contain state-of-the-art materials characterization instruments, including environmental and variable pressure field-emission scanning electron microscopes with Energy Dispersive Spectroscopy (EDS) for elemental analysis, and Orientation Image Microscopy (OIM) for texture analysis; a Transmission Electron Microscope (TEM) with STEM capability and TEM sample preparation equipment; a dual beam focused ion beam (FIB) system for nano-characterization and nano fabrication; a femtosecond/ terahertz laser Raman spectrometer; visible and ultraviolet Raman micro spectrometers with a total of 7 excitation wavelengths for non-destructive chemical and structural analysis and Surface Enhanced Raman (SERS); a Fourier Transform Infrared (FTIR) spectrometer with a microscope and full array of accessories; a Nanoindenter; an X-ray Photoelectron Spectrometer (XPS)/Electron Spectroscopy for Chemical Analysis (ESCA) system; and X-Ray Diffractometers (XRD), including small angle/wide angle X-Ray scattering (SAX/WAX).

More details of these instruments, information how to access them and instrument usage rates can be found on the Core Facilities web page (http://crf.coe.drexel.edu).

Materials Science and Engineering Faculty

Michel Barsoum, PhD *(Massachusetts Institute of Technology) A. W. Grosvenor Professor*. Professor. Processing and characterization of novel ceramics and ternary compounds, especially the MAX and 2-D MXene phases.

Hao Cheng, PhD *(Northwestern University)*. Assistant Professor. Drug delivery, molecular self-assembly, cell-nanomaterial interactions, regenerative medicine and cell membrane engineering.

Yury Gogotsi, PhD *(Kiev Polytechnic Institute) Director, A. J. Drexel Nanotechnology Institute*. Distinguished University & Trustee Chair Professor. Nanomaterials; carbon nanotubes; nanodiamond; graphene; MXene; materials for energy storage, supercapacitors, and batteries.

Richard Knight, PhD *(Loughborough University) Associate Department Head and Undergraduate Advisor*. Teaching Professor. Thermal plasma technology; thermal spray coatings and education; plasma chemistry and synthesis.

Christopher Y. Li, PhD *(University of Akron)*. Professor. Soft and hybrid materials for optical, energy, and bio applications; polymeric materials, nanocomposites, structure and properties.

Michele Marcolongo, PhD, PE *(University of Pennsylvania) Senior Associate Vice Provost for Translational Research*. Professor. Orthopedic biomaterials; acellular regenerative medicine, biomimetic proteoglycans; hydrogels.

Steven May, PhD *(Northwestern University)*. Assistant Professor. Synthesis of complex oxide films, superlattices, and devices; materials for energy conversion and storage; magnetic and electronic materials; x-ray and neutron scattering.

Ekaterina Pomerantseva, PhD *(Moscow State University, Russia)*. Assistant Professor. Solid state chemistry; electrochemical characterization, lithium-ion batteries, energy generation and storage; development and characterization of novel nanostructured materials, systems and architectures for batteries, supercapacitors and fuel cells.

James Rondinelli, PhD *(University of California, Santa Barbara)*. Assistant Professor. Electronic structure theory of inorganic materials; atomic structure driven view of functional properties; density functional theory-based materials design; inorganic carbides, oxides and fluorides for electronic, magnetic, optical and electrochemical applications.

Caroline L. Schauer, PhD *(SUNY Stony Brook) Graduate Advisor*. Associate Professor. Polysaccharide thin films and nanofibers.

Wei-Heng Shih, PhD *(Ohio State University)*. Professor. Colloidal ceramics and sol-gel processing; piezoelectric biosensors, optoelectronics, and energy harvesting devices; nanocrystalline quantum dots for bioimaging, lighting, and solar cells.

Jonathan E. Spanier, PhD *(Columbia University) Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Mitra Taheri, PhD *(Carnegie Mellon University) Hoeganaes Assistant Professor of Metallurgy*. Assistant Professor. Development of the ultrafast Dynamic Transmission Electron Microscope (DTEM) for the study of laser-induced microstructural evolution/phase transformations in nanostructured materials; use of various *in-situ* Transmission Electron Microscopy techniques.

Garritt Tucker, PhD *(Georgial Institute of Technology)*. Assistant Professor. Computational materials science and engineering; microstructural evolutiona nd material behavior in extreme environments; interfacial-driven processes for improving material functionality; multi-scale physics modeling.

Christopher Weyant, PhD *(Northwestern University)*. Associate Teaching Professor.

Antonios Zavaliangos, PhD *(Massachusetts Institute of Technology)*. Department Head and Professor. Constitutive modeling; powder compaction and sintering; pharmaceutical tableting, X-ray tomography.

Interdepartmental Faculty

Jason Baxter, PhD *(University of California, Santa Barbara)*. Associate Professor. Solar cells, semiconductor nanomaterials, ultrafast spectroscopy.

Yossef A. Elabd, PhD *(Johns Hopkins University)*. Professor. Fuel cells; polymer membranes; diffusion in polymers.

Adam K. Fontecchio, PhD *(Brown University) Electrical and Computer Engineering*. Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Alexander Fridman, DSc, PhD *(Moscow Institute of Physics and Technology) Mechanical Engineering and Mechanics, John A. Nyheim Endowed University Chair Professor, Director of the Drexel Plasma Institute*. Professor. Plasma science and technology; pollutant mitigation; super-adiabatic combustion; nanotechnology and manufacturing.

Haviva M. Goldman, PhD *(City University of New York) Neurobiology and Anatomy*. Associate Professor. Understanding how the size and shape of whole bones, as well as the distribution quantity and quality of the mineralized tissue that forms the bone, reflect both evolutionary constraints of skeletal growth and development, and responsiveness to mechanical loading during life.

Lin Han, PhD *(Massachusetts Institute of Technology)*. Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Emin Caglan Kumbur, PhD *(Pennsylvania State University)*. Assistant Professor. Next generation energy technologies; fuel cell design and development.

Kenneth K.S. Lau, PhD *(Massachusetts Institute of Technology)*. Associate Professor. Surface science; nanotechnology; polymer thin films and coatings; chemical vapor deposition.

Bahram Nabet, PhD *(University of Washington) Associate Dean for Special Projects, College of Engineering; Electrical and Computer Engineering*. Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Giuseppe R. Palmese, PhD *(University of Delaware) Department Head, Chemical and Biological Engineering*. Professor. Reacting polymer systems; nanostructured polymers; radiation processing of materials; composites and interfaces.

Wan Young Shih, PhD *(Ohio State University) School of Biomedical Engineering, Science and Health Systems*. Associate Professor. Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Karl Sohlberg, PhD *(University of Delaware)*. Associate Professor. Computational and theoretical materials-related chemistry: (1) complex catalytic materials; (2) mechanical and electrical molecular devices.

Margaret Wheatley, PhD *(University of Toronto) School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor*. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Emeritus Faculty

Roger D. Corneliussen, PhD *(University of Chicago)*. Professor Emeritus. Fracture, blends and alloys, as well as compounding.

Roger D. Doherty, PhD *(Oxford University)*. Professor Emeritus. Metallurgical processing; thermo-mechanical treatment.

Ihab L. Kamel, PhD *(University of Maryland)*. Professor Emeritus. Nanotechnology, polymers, composites, biomedical applications, and materials-induced changes through plasma and high energy radiation.

Jack Keverian, PhD *(Massachusetts Institute of Technology)*. Professor Emeritus. Rapid parts manufacturing, computer integrated manufacturing systems, strip production systems, technical and/or economic modeling, melting and casting systems, recycling systems.

Alan Lawley, PhD *(University of Birmingham, England)*. Professor Emeritus. Mechanical and physical metallurgy, powder metallurgy, materials engineering design, engineering education.

Mechanical Engineering and Mechanics

Major: Mechanical Engineering and Mechanics
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MS) or 90.0 (PhD)
Classification of Instructional (CIP) code: 14.1902
Standard Occupational Classification (SOC) code: 17-2141

About the Program

The Mechanical Engineering and Mechanics (MEM) Department (http://drexel.edu/mem) offers MS and PhD degrees. The courses often associate with one or more areas of specialization: design and manufacturing, mechanics, systems and control, and thermal and fluid sciences. The mechanical engineering field is rapidly changing due to ongoing advances in modern science and technology. Effective mechanical engineers must possess expertise in mechanical engineering core subjects, interdisciplinary skills, teamwork skills, as well as entrepreneurial and managerial abilities. The degree programs are designed so students can learn the state-of-the-art knowledge now, and have the foundation to acquire new knowledge as they develop in future.

The MS degree program is offered on both a full-time and a part-time basis. The General (Aptitude) Test of the Graduate Record Examination (GRE) is required for applicants pursuing full-time study. Graduate courses are often scheduled in the late afternoon and evening, so full-time students and part-time students can take the same courses. The department has recently adopted the Graduate Co-op program at the master's level as an option.

The PhD degree program is offered for full-time students only and is a research intensive program. The research areas include, but are not limited to, bio-engineering, energy systems, high performance materials, nanotechnology, plasma science and engineering, and robotics.

Admission Requirements

Applicants must meet the graduate requirements for admission to Drexel University. Students holding a bachelor's degree in a science or engineering discipline other than mechanical engineering are advised to take several undergraduate courses as preparation for graduate studies. Though these courses are not counted toward the required credits for the degree, they also must be listed in the student's plan of study. Outstanding students with a GPA of at least 3.5 in their master's program will be considered for admission to the program leading to the doctor of philosophy degree in mechanical engineering.

Master of Science in Mechanical Engineering and Mechanics

Requirements

The MS program has a two-fold mission: to prepare some students for continuation of their graduate studies and research toward a PhD degree, and to prepare other students for a career in industry upon graduation with the MS degree. The MS program has a non-thesis option and a thesis option.Students who plan to continue to the PhD degree are advised to select the thesis-option.

The MS program is structured so that students have the opportunity to specialize in areas of interest while also obtain the broadest engineering education possible. Of the required 45.0 credits (15 courses) MS students are required to complete two core-course sequences (two terms each) from two different core areas. Students can take eight technical elective courses of which up to four courses can be from outside the Mechanical Engineering and Mechanics Department if they are approved in the students' plan of study. MS students have opportunity to apply to the optional graduate Co-op program. Students in the MS program should consult with the department graduate adviser at the beginning of their program and must file a plan of study prior to the third quarter of study. Further details can be obtained from the department's Graduate Programs Manual.

Typical MS Program

Two Core-Course Sequences (required)	12.0
Three Mathematics Courses (required) [*]	9.0
Eight Technical Electives (including 9 credits for thesis option)	24.0
Total Credits	**45.0**

[*]   Mathematics courses: MEM 591, MEM 592, MEM 593.

Core Areas

All students take core courses in the department's areas of specialization as part of a comprehensive and flexible program. Further details can be obtained from the department's Graduate Programs Manual (http://www.drexel.edu/mem/academics/graduate/grad-manual).

The core courses in each area are listed below:

Mechanics Area

Theory of Elasticity		
MEM 660	Theory of Elasticity I	3.0
MEM 661	Theory of Elasticity II	3.0
Solid Mechanics		
MEM 663	Continuum Mechanics	3.0
MEM 664	Introduction to Plasticity	3.0

Advanced Dynamics		
MEM 666	Advanced Dynamics I	3.0
MEM 667	Advanced Dynamics II	3.0
Systems and Control Area		
Robust Control Systems		
MEM 633	Robust Control Systems I	3.0
MEM 634	Robust Control Systems II	3.0
Non-Linear Control Theory		
MEM 636	Theory of Nonlinear Control I	3.0
MEM 637	Theory of Nonlinear Control II	3.0
Real-Time Microcomputer Control		
MEM 639	Real Time Microcomputer Control I	3.0
MEM 640	Real Time Microcomputer Control II	3.0
Thermal and Fluid Sciences Area		
Advanced Thermodynamics [*]		
MEM 601	Statistical Thermodynamics I	3.0
MEM 602	Statistical Thermodynamics II	3.0
Heat transfer		
MEM 611	Conduction Heat Transfer	3.0
MEM 612	Convection Heat Transfer	3.0
or MEM 613	Radiation Heat Transfer	
Fluid Mechanics [*]		
MEM 621	Foundations of Fluid Mechanics	3.0
MEM 622	Boundry Layers-Laminar & Turbulent	3.0

[*]   Consult the Thermal and Fluid Sciences area advisor for other options.

PhD in Mechanical Engineering

Outstanding students with a GPA of at least 3.5 in their master's program will be considered for admission to the program leading to the Doctor of Philosophy degree in mechanical engineering.

PhD Course Requirements
At least 90.0 credits are required for the PhD degree. The master's degree is not a prerequisite for the PhD, but does count as 45.0 credits toward the 90.0 credit requirement.

For students entering the PhD program with a prior MS degree:

- 45.0 credits of graduate courses out of which 18.0 credits are graduate courses exclusive of independent study and dissertation. If the MS degree was not from Drexel's Mechanical Engineering and Mechanics (MEM) Department, 12.0 of these 18.0 credits must be MEM graduate courses (600-level or above). The remaining 27.0 credits consist of a combination of dissertation, independent study, and additional advanced coursework consistent with the approved plan of study.

For students entering the PhD program with a BS degree but without a prior master's degree:

- 90.0 credits of graduate courses. 45.0 of these 90.0 credits must satisfy the MS in Mechanical Engineering degree requirements. The remaining 45.0 credits must satisfy the requirements above.

PhD Candidacy Examination
A graduate student in the PhD program needs be nominated by his/her supervising adviser to take the candidacy examination. A student who

enters the PhD program with a prior MS degree must take the Candidacy Examination within the first year after entry to the PhD program. A student who enters the PhD program without a prior MS degree must take the Candidacy Examination within 2 years after entry to the PhD program.

The Candidacy Examination consists of two components: A course-component examination and a research-component examination. The student must demonstrate excellence in both components. The research-component examination consists of a written report and an oral presentation. The Candidacy Committee selects three or more research papers in the student's declared research area for student to conduct a critical review. In three weeks the student submits a written report. One week after the written report is submitted the student makes an oral presentation. The presentation is followed by questions by the Committee. The goals of the questions: To evaluate the student's knowledge in the scientific fields related to the research area, including related background and fundamental material, and the student's ability to integrate information germane to success in research. Additional details are given in the Mechanical Engineering and Mechanics Graduate Program Manual.

Thesis Proposal
At least one year prior to graduation, the PhD candidate must give a thesis proposal to the dissertation advisory committee. The student must submit a written proposal and make a presentation. The written proposal normally includes: abstract, introduction, detailed literature review, preliminary results, proposed research tasks and timetable. The committee will approve/reject the thesis topic, the scope of work and the general method of attack.

Thesis Defense
A final examination consisting of a presentation and defense of the research dissertation is required, before the PhD degree is granted.

Further details can be obtained from the department's Graduate Programs Manual (http://drexel.edu/mem/academics/graduate/grad-manual).

Facilities

A. J. Drexel Plasma Institute (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=11)
The A. J. Drexel Plasma Institute (DPI) was formed in 2002 to stimulate and coordinate research projects related to plasma and other modern high energy engineering techniques. Today the DPI is an active multidisciplinary organization involving 23 faculty members from 6 engineering departments working in close collaboration with School of Biomedical Engineering, College of Arts and Sciences and College of Nursing and Health Professions.

Advanced Design and Manufacturing Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=6)
This laboratory provides research opportunities in design methodology, computer-aided design, analysis and manufacturing, and materials processing and manufacturing. Facilities include various computers and software, I-DEAS, Pro/E,ANSYS, MasterCAM, Mechanical DeskTop, SurfCAM, Euclid, Strim, ABQUS, and more.The machines include two Sanders Model Maker rapid prototyping machines, a BridgePort CNC Machining Center, a BOY 220 injection molding machine, an Electra high-temperature furnace for metal sintering, infiltration, and other heat treatment.

Biofluid Mechanics Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=5)
The biofluid mechanics laboratory conducts computational and experimental research on the dynamics of flow in the cardiovascular and respiratory system, and the effects of flow on biological processes, particularly hemostasis and thrombosis. Lab resources include high-performance engineering workstations, commercial computational fluid dynamics (CFD) software, and basic experimental facilities including Laser Doppler Velocimetry (LDV), pressure and flow transducers, pumps, and microscopes.

Biological Systems Analysis Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=5)
The research in the Laboratory for Biological Systems Analysis involves the integration of biology with systems level engineering analysis and design, with an emphasis on: (1) the development of robotic systems that borrow from nature's designs and use novel technologies to achieve superior performance and function; and (2) the use of system identification techniques to evaluate the functional performance of animal physiological systems under natural, behavioral conditions. Facilities include rapid prototyping machines, compliant material manufacturing, mold making facilities, and a traditional machine shop and electronics workshop.

Biomechanics Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=2)
Emphasis in this laboratory is placed on understanding the mechanical properties of human joints, characterization of the mechanical properties of biological materials, studies of human movements, and design and development of artificial limbs. Facilities include a 3-D kinematic measuring system, Instron testing machine, and microcomputers for data acquisition and processing. Additional biomechanical laboratory facilities are available at Moss Rehab Hospital.

Combustion, Fuel Chemistry, and Emissions Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
Emphasis in this laboratory is placed on developing an understanding of both the chemical and physical factors that control and, hence, can be used to tailor combustion processes for engineering applications. Facilities include two single cylinder research engines, a pressurized flow reactor (PFR) facility, flat flame and slot burner systems, and complete analytical and monitoring instrumentation. The engine systems are used to study the effects of operating variables, fuel type, ambient conditions, and control devices on engine performance and emissions. The PFR facility is used for detailed kinetic studies of hydrocarbon pyrolysis and oxidation processes.

Combustion Diagnostics Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
High speed cameras, spectrometers, and laser systems are used to conduct research in (1) low temperature hydrocarbon oxidation, (2) cool flames, and (3) plasma-assisted ignition and combustion. Research in optical diagnostic development is conducted in this lab with a specific focus on tools to measure small peroxy radicals.

Complex Fluids and Multiphase Transport Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
The research focus of this lab lies at the interface of thermal-fluid sciences, nano materials, and colloid and surface sciences. We apply these fundamental sciences to advance energy conversion and storage systems, to provide effective thermal management solutions, and to enable scalable additive nanomanufacturing. Facilities include materials printing systems, fluorescence microscope and imaging systems, complex fluid characterization, microfluidics and heat transfer testers, coating and solar cell testing devices, electrochemical characterization, and high performance computing facilities.

Composite Mechanics Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
Emphasis in this laboratory is placed on the characterization of performance of composite materials. Current interest includes damage mechanisms, failure processes, and time-dependent behavior in resin-, metal-, and ceramic-matrix composites. Major equipment includes servo-hydraulic and electromechanical Instron testing machines, strain/displacement monitoring systems, environmental chambers, microcomputers for data acquisition and processing, composites fabrication facility, interferometric displacement gauge, X-radiography, and acoustic emission systems.

Dynamic Multifunctional Materials Laboratory (DMML) (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
The focus of DMML is mechanics of materials; namely fracture and failure mechanisms under extreme conditions and their correlation to meso- and microstructural characteristics. Utilizing highly integrated experimental facilities such as a Kolsky (split-Hopkinson pressure bar), single-stage, and two stage light-gas gun, complex material behavior is deconstructed into dominant time and length scales associated with the energetics of damage evolution. In-situ laser and optical diagnostics such as caustics, interferometry techniques, schlieren visualization and virtual grid method, are used to investigate coupled field properties of multifunctional materials with the goal of not only analyzing and understanding behavior, but ultimately tailoring material properties for specific applications.

Electrochemical Energy Systems Laboratory (ECSL) (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
The ECSL is specializes in the design, diagnostics and characterization of next generation electrochemical energy conversion and storage systems. Current areas of research include flow-assisted supercapacitors, next generation flow battery technology and fuel cells for transportation, stationary and portable applications. ECSL utilizes a comprehensive approach, including: advanced diagnostics, system design, materials characterization, and computational modeling of electrochemical energy systems. The core mission of ECSL is to develop novel diagnostic and computational tools to understand critical issues in flow-assisted electrochemical systems and enable better system design. Due to the complex nature of these systems, our research is highly interdisciplinary and spans the interface of transport phenomena, materials characterization, electrochemistry and system engineering.

Microcomputer Controls Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=7)
This laboratory provides an environment conducive to appreciating aspects of systems and control through hands-on experiments. They range from data acquisition and processing to modeling of dynamical systems and implementing a variety of controllers to control systems, such as DC motors and the inverted pendulum. Facilities also include microcontrollers such as Basic Stamp and the Motorola 68HCI 1. Active research is being conducted on control reconfiguration in the event of actuator failures in aircrafts.

Non-Newtonion Fluid and Heat Transfer Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=7)
Emphasis in this laboratory is placed on the study of hydrodynamic and thermal performance of various non-Newtonian viscoelastic fluids in complex flow geometries. Facilities and equipment include a 20-foot-long recirculating flow loop with a 500-gallon reservoir tank and a thermal conductivity measurement cell. A complete data acquisition system provides fully automated experimental operation and data reduction. A state-of-the-art finite element code FIDAP running on a CDC 180 computer provides three-dimensional flow and heat transfer simulations of flows in complex geometrics, with a complete post-processing graphic capability backed by template.

Precision Instrumentation and Metrology Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=7)
This laboratory is focused on activities related to precision measurement, computer-aided inspection, and precision instrument design. Facilities include 3D Coordinate Measuring Machine (Brown & Sharpe) with Micro Measurement and Reverse engineering software, Surface Profilometer, and Laser Displacement Measuring System.

Rheology Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=7)
Emphasis in this laboratory is placed on developing tools for rheological property measurement of various non-Newtonian fluids, including friction-reducing viscoelastic fluids, molten polymers, coal-water slurries, ceramic slurries, and bonding cements for biomedical applications. A capillary tube viscometer, falling ball and needle viscometers, and Brookfield rotating viscometer are available. In particular, the capillary tube viscometer is designed to allow fully automated operation, thus avoiding time-consuming data collection procedures. A high-temperature and high-pressure capillary tube viscometer is under development, so that viscosities of advanced polymer materials can be measured at relatively high temperatures and shear rates.

Space Systems Laboratory (SSL) (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
The objective of SSL is ". . . to inspire future generations to advance aerospace engineering.' It provides research opportunities in orbital mechanics, rendezvous and docking maneuvers, mission planning, and space environment. The lab provides facilities for activities in High Altitude Balloons, construction of air-vehicles and nano-satellites, 0-g flights, and STK simulation package for satellite flights and trajectories.

Theoretical and Applied Mechanics Group (TAMG) (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
Research in the TAMG focuses on using experimental, analytical and computational tools to understand deformation and failure of materials, components and structures in a broad range of time and length scales. To accomplish this goal, TAMG develops procedures that include mechanical behavior characterization coupled with non-destructive testing and modern computational tools. This information is used both for understanding the role of important material scales in the observed bulk behavior and for the formulation of constitutive laws that can model the response including damage initiation and progression according to prescribed loading conditions. Equipment and facilities used by TAMG include a range of mechanical testing equipment for testing in tension, compression, fatigue and fracture as well as: a) two multichannel Acoustic Emission systems, b) a 5 Megapixel Digital Image Correlation system, c) a FLIR infrared thermography camera, and d) a 64-core High Performance Computational Cluster. TAMG has further developed procedures to use several pieces of equipment and facilities at Drexel University including the Machine Shop, Centralized Research Facilities and the University Research Computing Faci

Thermal Systems Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
The thermal systems laboratory is outfitted with an array of instrumentation and equipment for conducting single- and multiphase heat transfer experiments in controlled environments. Facilities include computer-controlled data acquisition (LabVIEW) systems, a Newport holographic interferometric system with associated lasers and optics, image enlargers, power amplifiers, precision voltmeters, slip-ring

assemblies, and workstation for large-scale computing and simulation. A draft-free room is available with independent temperature control for carrying out natural convection experiments. An experimental test-rig is available for studying heat transfer from rotating surfaces. A bubble column has been recently built to study multiphase flow and heat transfer problems. Facilities are also available for measuring thermal conductivities of thin films using a thermal comparator.

Vascular Kinetics Laboratory (VKL) (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)
The VKL uses engineering methods to understand how biomechanics and biochemistry interact in cardiovascular disease. In particular, we study fluid flow and blood vessel stiffness impact cellular response to glucose, growth factors, and inflammation to lead to atherosclerosis and metabolic syndrome. We then apply these discoveries to novel biomaterials and therapies, with a particular focus on treating cardiovascular disease in under-served populations. This research is at the interface of engineering and medicine, with close collaborations with biologists and physicians and a strong emphasis on clinical applications.

Mechanical Engineering and Mechanics Faculty

Jonathan Awerbuch, DSc *(Technion, Israel Institute of Technology).* Professor. Mechanics of composites; fracture and fatigue; impact and wave propagation; structural dynamics.

Philipp Boettcher, PhD *(California Institute of Technology).* Assistant Teaching Professor. Thermal and hot surface ignition of hydrocarbons; high speed flow diagnostics; absorption and emission spectroscopy.

Nicholas P. Cernansky, PhD *(University of California-Berkeley) Hess Chair Professor of Combustion.* Professor. Combustion chemistry and kinetics; combustion generated pollution; utilization of alternative and synthetic fuels.

Bor-Chin Chang, PhD *(Rice University).* Professor. Computer-aided design of multivariable control systems; robust and optimal control systems.

Young I. Cho, PhD *(University of Illinois-Chicago).* Professor. Heat transfer; fluid mechanics; non-Newtonian flows; biofluid mechanics; rheology.

Alisa Clyne, PhD *(Harvard-Massachusetts Institute of Technology).* Associate Professor. Cardiovascular biomechanics.

Bakhtier Farouk, PhD *(University of Delaware) Billings Professor of Mechanical Engineering.* Professor. Heat transfer; combustion; numerical methods; turbulence modeling; materials processing.

Alexander Fridman, DSc, PhD *(Moscow Institute of Physics and Technology) Mechanical Engineering and Mechanics, John A. Nyheim Endowed University Chair Professor, Director of the Drexel Plasma Institute.* Professor. Plasma science and technology; pollutant mitigation; super-adiabatic combustion; nanotechnology and manufacturing.

Ani Hsieh, PhD *(University of Pennsylvania).* Assistant Professor. Multi-robot systems, decentralized and distributed control, bio-inspired control, swarm robotics.

Andrei Jablokow, PhD *(University of Wisconsin; Madison).* Associate Teaching Professor. Computational kinematics; geometric modeling.

Suhada Jayasuriya, PhD *(Wayne State University) Department Head, Mechanical Engineering and Mechanics.* Distinguished Professor. Multi-agent systems; machine diagnostics in turbomachinery; human-machine interaction; structural health monitoring; alternative energy systems; gait studies in biomechanics.

Antonios Kontsos, PhD *(Rice University).* Assistant Professor. Applied mechanics; probabilistic engineering mechanics; modeling of smart multifunctional materials.

Emin Caglan Kumbur, PhD *(Pennsylvania State University).* Assistant Professor. Next generation energy technologies; fuel cell design and development.

Harry G. Kwatny, PhD *(University of Pennsylvania) S. Herbert Raynes Professor of Mechanical Engineering.* Professor. Dynamic systems analysis; stochastic optimal control; control of electric power plants and systems.

John Lacontora, PhD *(New Jersey Institute of Technology).* Associate Research Professor. Service engineering; industrial engineering.

Leslie Lamberson, PhD *(California Institute of Technology).* Assistant Professor. Dynamic behavior of materials, dynamic fracture, damage micromechanics, active materials.

Alan Lau, PhD *(Massachusetts Institute of Technology) Associate Department Head for Graduate Affairs, Department of Mechanical Engineering and Mechanics.* Professor. Deformation and fracture of nano-devices and macroscopic structures; damage-tolerant structures and microstructures.

Matthew McCarthy, PhD *(Columbia University).* Assistant Professor. Micro- and nanoscale thermofluidic systems, bio-inspired cooling, smart materials and structures for self-regulated two-phase cooling, novel architectures for integrated energy conversion and storage.

David L. Miller, PhD *(Louisiana State University).* Professor. Gas-phase reaction kinetics; thermodynamics; biofuels.

Alexander Moseson, PhD *(Drexel University).* Assistant Teaching Professor. Sustainability; engineering design; humanitarian (appropriate) technology; international development; service learning

Hongseok Noh, PhD *(Georgia Institute of Technology).* Associate Professor. MEMS; BioMEMS; lab-on-a-chip; microfabrication; microfluidics.

Paul Y. Oh, PhD *(Columbia University) Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics.* Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Sorin Siegler, PhD *(Drexel University).* Professor. Orthopedic biomechanics; robotics; dynamics and control of human motion; applied mechanics.

Wei Sun, PhD *(Drexel University) Albert Soffa Chair Professor of Mechanical Engineering.* Professor. Computer-aided tissue engineering; solid freeform fabrication; CAD/CAM; design and modeling of nanodevices.

Ying Sun, PhD *(University of Iowa).* Associate Professor. Transport processes in multi-component systems with fluid flow; heat and mass transfer; phase change; pattern formation.

Tein-Min Tan, PhD *(Purdue University) Associate Department Head for Undergraduate Affairs, Department of Mechanical Engineering and Mechanics*. Associate Professor. Mechanics of composites; computational mechanics and finite-elements methods; structural dynamics.

James Tangorra, PhD *(Massachusetts Institute of Technology) Associate Department Head for Finance and Administration, Department of Mechanical Engineering and Mechanics*. Associate Professor. Analysis of human and (other) animal physiological systems; head-neck dynamics and control; balance, vision, and the vestibular system; animal swimming and flight; robotics; system identification; bio-inspired design.

Christopher Weinberger, PhD *(Stanford University)*. Assistant Professor. Multiscale materials modeling of mechanical properties including DFT, atomistics, mesoscale and microscale FEM modeling.

Ajmal Yousuff, PhD *(Purdue University)*. Associate Professor. Optimal control; flexible structures; model and control simplifications.

Jack G. Zhou, PhD *(New Jersey Institute of Technology)*. Professor. CAD/CAM; computer integrated manufacturing systems; rapid prototyping; system dynamics and automatic control.

Interdepartmental Faculty

Richard Chiou, PhD *(Georgia Institute of Technology)*. Associate Professor. Green manufacturing, mechatronics, Internet-based robotics and automation, and remote sensors and monitoring.

Michael Glaser, MFA *(Ohio State University) Program Director for Product Design*. Assistant Professor. Quantifying the designer's intuition; the interplay between digital and physical forms; human desire to shape our surroundings.

Yury Gogotsi, PhD *(Kiev Polytechnic Institute) Director, A. J. Drexel Nanotechnology Institute*. Distinguished University & Trustee Chair Professor. Nanomaterials; carbon nanotubes; nanodiamond; graphene; MXene; materials for energy storage, supercapacitors, and batteries.

Y. Grace Hsuan, PhD *(Imperial College)*. Professor. Polymeric and cementitioius materials; geosynthetic reliability and durability.

Michele Marcolongo, PhD, PE *(University of Pennsylvania) Senior Associate Vice Provost for Translational Research*. Professor. Orthopedic biomaterials; acellular regenerative medicine, biomimetic proteoglycans; hydrogels.

Michel Miller, PhD *(University of Miami, Florida)*. Auxiliary Assistant Professor. Special education.

Mira S. Olson, PhD *(University of Virginia)*. Associate Professor. Groundwater; environmental fluid mechanics; hydrology.

William C. Regli, PhD *(University of Maryland-College Park)*. Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Jonathan E. Spanier, PhD *(Columbia University) Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Emeritus Faculty

Leon Y. Bahar, PhD *(Lehigh University)*. Professor Emeritus. Analytical methods in engineering, coupled thermoelasticity, interaction between analytical dynamics and control systems.

Pei C. Chou, ScD *(Aeronautical Engineering from New York University) Billings Professor Emeritus of Mechanical Engineering*. Professor Emeritus. Material response due to impulsive loading, wave propagation in isotropic and composite materials, manufacturing technology.

Gordon D. Moskowitz, PhD *(Princeton University)*. Professor Emeritus. Biomechanics, dynamics, design, applied mathematics.

Donald H. Thomas, PhD *(Case Institute of Technology)*. Professor Emeritus. Biocontrol theory, biomechanics, fluidics and fluid control, vehicle dynamics, engineering design.

Albert S. Wang, PhD *(University of Delaware) Albert and Harriet Soffa Professor*. Professor Emeritus. Treatment of damage evolution processes in multi-phased high-temperature materials, including ceramics and ceramic-matrix composites.

The College of Medicine

Overview

Renowned for its innovative, student-centered educational programs, Drexel University College of Medicine (http://www.drexelmed.edu) (DUCOM) is the consolidation of two venerable medical schools with rich and intertwined histories: Hahnemann Medical College and Woman's Medical College of Pennsylvania. Established in 1848 and 1850, respectively, they were two of the earliest medical colleges in the United States, and Woman's was the very first medical school for women in the nation.
Today, there are over 1,000 medical students. There are some 625 residents, 700 clinical and basic science faculty, and more than 2,000 affiliate and other non-compensated faculty.

Within the College of Medicine, The School of Biomedical Sciences and Professional Studies (p. 54) offers an additional 24 majors and 8 professional certificates.

Major

- Medicine (MD) (p. 341)

About the College of Medicine

Mission Statement

Drexel University College of Medicine excels and innovates in education, research, and delivery of compassionate care in our culture of diversity, spirited inquiry, collaboration, and opportunity.

About the College

The College of Medicine's main campus, Queen Lane, is in a suburban-like setting in the East Falls section of Philadelphia. Additional facilities are located at the Center City campus, next to Hahnemann University Hospital. Our Pediatrics Department is at St. Christopher's Hospital for Children, and the Psychiatry Department is based at Friends Hospital. Students can receive clinical education at more than 20 affiliated hospitals and ambulatory sites chosen for their commitment to teaching as well as medical excellence. The College of Medicine is renowned for its innovative educational programs, enhanced by the use of technology that permeates all components of the curriculum.

The College's medical practice, Drexel Medicine®, is a patient-focused practice emphasizing quality, innovation and community service, and enhanced by physician involvement in the research and educational programs.

Collaborative projects leveraging Drexel University's technological expertise continue to push the frontiers of nanomedicine and neuroengineering. The College of Medicine is a major regional center for spinal cord research, and has developed one of the leading centers for malaria study in the nation. Additionally, the College is home to a memory disorders center dedicated to ground-breaking research in Alzheimer's and related dementias.

Drexel University College of Medicine houses one of eight National Institute on Drug Abuse (NIDA) Centers of Excellence for Physician Information, one of 21 National Centers of Excellence in Women's Health designated by the Department of Health & Human Services, the Executive Leadership in Academic Medicine (ELAM) program, and the Archives and Special Collections on Women in Medicine. It has developed the largest HIV/AIDS primary care practice in the Mid-Atlantic region, with extensive NIH-funded research in prevention and therapeutic intervention. Faculty clinicians are highly respected in numerous other specialties, including cardiology and pain management.

The Doctor of Medicine (MD) Program

About the Program

With its dedication to academic and clinical excellence, Drexel University College of Medicine has earned national recognition as an institution that provides innovation in medical education. Medical students are trained to consider each patient's case and needs in a comprehensive integrated manner, taking into account many more factors than the presenting physiological condition. The medical college is dedicated to preparing "Physician Healers" – doctors who practice the art, science and skill of medicine.

Recognizing that students have different learning styles, students choose between two innovative academic curricula for their first two years of study. Both options focus on professional medical education, preparing students to pursue a career as either a generalist or specialist. Both stress problem solving, lifelong learning skills and the coordinated teaching of basic science with clinical medicine.

Both curricular tracks give early exposure to clinical skills training by using standardized patients to help students learn the art and skill of taking histories, counseling and educating patients, and performing physical exams.

The IFM Curriculum
The Interdisciplinary Foundations of Medicine (http://www.drexelmed.edu/Home/AcademicPrograms/MDProgram/DrexelsInnovativeCurriculum/YearsOneandTwo/InterdisciplinaryFoundationsofMedicine.aspx) (IFM) curriculum integrates basic science courses and presents them through clinical symptom-based modules. Each first-year module focuses on clinical symptoms and features relevant material from the perspective of several basic and behavioral science disciplines. By the end of the first year, the basic and behavioral science courses have presented their entire core content, integrating it with related material in other disciplines. In the second year, students study basic and clinical sciences using an organ system approach. Students learn in lectures, labs, and small group settings.

The PIL Curriculum
Students who choose the Program for Integrated Learning (http://www.drexelmed.edu/Home/AcademicPrograms/MDProgram/DrexelsInnovativeCurriculum/YearsOneandTwo/ProgramforIntegratedLearning.aspx) (PIL), a problem-based curriculum, learn primarily in small groups which are supervised and facilitated by faculty. There are seven 10-week blocks over the first two years. Each block contains 10 case studies, detailing real patient issues relating to the topics of the block. The cases serve as the stimulus and context for students to search out the information they need to understand, diagnose, and treat clinical problems. Developing the information they need to learn is crucial to the PIL approach. Sharing information, concept mapping, evaluating and giving and receiving feedback are essential facets of the curriculum. Laboratories and lectures complement the case studies.

Years 3 and 4

The third year curriculum (http://www.drexelmed.edu/Home/
AcademicPrograms/MDProgram/DrexelsInnovativeCurriculum/
YearThree.aspx) is devoted to required clinical clerkship rotations
in medicine, family medicine, obstetrics and gynecology, pediatrics,
psychiatry, and surgery. The clerkships all embody the following
principles:

- Common curricular objectives at all sites
- Students spend 30% of their clinical time in expanded ambulatory
  care experiences
- Each clerkship incorporates the concept of interdisciplinary teaching,
  with representatives of other departments or service areas
- Each clerkship integrates the teaching of basic sciences into clinical
  material

All third year clerkships take place in Drexel's affiliated hospitals (http://
www.drexelmed.edu/Home/AboutTheCollege/AffiliatedHospitals.aspx).
Students' assignments for the third year are based on the results of a
lottery system.

The fourth-year curriculum (http://www.drexelmed.edu/Home/
AcademicPrograms/MDProgram/DrexelsInnovativeCurriculum/
YearFour.aspx) is structured in the form of "pathways" – courses that
give students a well-rounded educational experience with some focus on
potential careers. Students can choose a discipline-specific or generalist
pathway. All students have a pathway advisor. The pathway system is
structured so that students take both required courses and electives. The
required courses include a sub internship in internal medicine, a clerkship
in neurology and an additional course specific to the pathway chosen.
Students also choose six elective courses, in close consultation with their
pathway advisor.

Fourth-year students complete their required courses at Drexel's affiliated
hospitals. However, pathway advisors usually advise their students to
select electives outside the Drexel system. Additionally, opportunities exist
for fourth-year electives at international sites.

For more information, visit the College of Medicine's MD Program (http://
www.drexelmed.edu/TheMDProgram/tabid/87/Default.aspx) web site.

Dual Degree Programs

MD/PhD Program

The MD/PhD program is designed for a limited number of individuals
who are strongly motivated toward a career in academic medicine
and medically oriented research. The program trains individuals in the
fundamental clinical aspects of medicine and offers advanced training
in biochemistry, microbiology and immunology, molecular and cellular
biology, neuroscience and pharmacology, as well as medical engineering.
Physicians with extensive research training are uniquely positioned
to advance medical care and to teach at the cutting edge of medical
discovery. Tuition scholarships and stipends for medical school and
graduate school are provided for a limited number of students.

MD/MPH

With Drexel's School of Public Health, the College of Medicine offers a
joint five-year program for highly qualified students to pursue both the
MD and the Master of Public Health degrees. Students are taught to be
physicians with a public-health orientation to the development, planning,
delivery, and evaluation of health care programs and policies.

MD/MBA

The MD/MBA degree meets a growing demand by physicians who wish to
manage corporate medical practices, hospitals, and related organizations
and contribute to the development of health policy. The joint program
prepares physicians to apply management principles to individual or
group practices or to move into management positions at many types of
organizations. Students receive training at both the College of Medicine
and at Drexel's A.A.C.S.B. -accredited LeBow College of Business. The
program lets students earn both degrees in five years.

MD/Healthcare Ethics MA

Drexel medical students may enter a combined degree pathway to receive
a master's degree in health care ethics through St. Joseph's University.
Students spend a year in residence at St. Joseph's University, usually
after their second medical school year. They receive two course credits
toward the master's degree from their medical school coursework.

For additional information, visit the College's Dual Degrees (http://
www.drexelmed.edu/Home/AcademicPrograms/MDProgram/
AdditionalOpportunities/DualDegree.aspx) page.

The School of Biomedical Engineering, Science, and Health Systems

Mission Statement

The mission of the School of Biomedical Engineering, Science and Health Systems is to promote health and quality of life through education, research and innovation that integrates engineering and life sciences in a global context.

The School of Biomedical Engineering, Science, and Health Systems (http://www.biomed.drexel.edu/new04/default.cfm) is a nationally recognized center for research in biomedical engineering and science. The School offers multidisciplinary instruction on a full- and part-time basis at the graduate level and full-time instruction at the undergraduate level. The faculty includes individuals with engineering, physics, mathematics, biostatistics, life science, medical, and clinical specialties. Multidisciplinary and translational research is carried out through collaboration among Drexel University faculty members and with medical schools and hospitals in the Philadelphia area.

The School offers MS and PhD programs in biomedical engineering and biomedical science. Areas of specialization available include biomaterials and tissue engineering, neuroengineering, biosensors and devices, biomedical imaging, biostatistics, genome science and bioinformatics, systems biology, biomechanics, human factors and performance engineering.

Majors

- Biomedical Engineering (MS, PhD) (p. 345)
- Biomedical Science (MS, PhD) (p. 348)

Certificates

- Bioinformatics (p. 344)
- Biomedical Technology Development (p. 345)
- Medical Product Design and Device Development (p. 351)
- Tissue Engineering (p. 345)

About the School

The School of Biomedical Engineering, Science, and Health Systems (http://www.biomed.drexel.edu) (formerly the Biomedical Engineering and Science Institute, founded in 1961) is a leader in biomedical engineering and biomedical science research and education. The undergraduate program was inaugurated in September 1998 and has steadily grown to attract the highest ability students at the University.

The School's areas of academic thrust, both in research and education, are at the forefront of biosensing, bioimaging, bioinformation engineering and integrated bioinformatics, drug delivery, biomedical ultrasound & optics, bionanotechnology, cellular tissue engineering, neuroengineering and human performance. Emerging initiatives include skin bioengineering, pediatric engineering and homeland security technologies. Various departments at Drexel University offer courses that are suited for students in biomedical engineering and biomedical science. The School

of Biomedical Engineering, Science and Health Systems' curriculum complements the strengths of the Colleges of Arts & Sciences, Business, Engineering, Computing and Informatics, Law and Medicine.

The marriage of technology with biology and medicine drives the 21st Century industrial enterprise. Consistent with this mission, the School strives for clinical and industrial relevance in academic pursuits, and enjoys a strong entrepreneurship program in biomedical technologies. The School's alliance with regional economic development agencies and corporations together with advisors from business development, legal, and investment communities sustains the growth of this program. The students and faculty of the School are committed to move their discoveries from our laboratories to clinical practice or home use. The success of Drexel's Translational Research in Biomedical Technologies program has been recognized and funded regionally as well as nationally.

The School has experienced remarkable growth in recent years thanks to outstanding research portfolio, high quality and innovative undergraduate program, and a multidisciplinary approach to education and research. Another competitive advantage is the unique free-standing university-level administrative structure with its own tenure-track faculty lines, budget and space. This helps transcend the traditional organizational boundaries of engineering, sciences and medicine. The School of Biomedical Engineering, Science and Health Systems' independence allows for the pursuit of growth and collaborations in various disciplines. Its small size provides agility to reconfigure and reorganize in response to emerging opportunities. The University Strategic Plan recognizes the School of Biomedical Engineering, Science and Health Systems as "Drexel's prototype of academic integration. "

Metropolitan Philadelphia has one of the nation's highest concentrations of medical institutions and pharmaceutical, biotechnology, medical device and systems industry. The School has forged strategic partnerships with select universities, research institutes, health care institutions and industries in the region. The School enjoys a close working relationship with Drexel's College of Medicine as well as alliances with prominent medical institutions in the region to develop joint research and educational programs. These include University of Pennsylvania, Thomas Jefferson University, the Fox Chase Cancer Center and the Wistar Institute. These collaborative initiatives provide students with ample opportunities in basic and clinical research as well as innovative academic programs.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (http://www.biomed.drexel.edu/new04/Content/research/facilities) web page for more details about the laboratories and equipment available.

Applicants to the graduate program must meet the requirements for admission to graduate studies at Drexel University. Candidates for degrees in the School of Biomedical Engineering, Science and Health Systems are required to maintain academics standards applicable to all graduate students at Drexel University.

Program Objectives

The overall objective of the graduate programs offered by the School of Biomedical Engineering, Science, and Health Systems is to provide multidisciplinary curricula with an instructional core and research opportunities for students. Graduate biomedical engineering students are typically individuals with undergraduate degrees in engineering, physical sciences, or mathematics. The core curriculum provides the necessary training in life and medical sciences, modeling and simulation, and biomedical engineering applications to allow students to apply their

engineering skills and perspective to solve current problems in biology and medicine. Areas in which students may focus their advanced studies and research attention include biomechanics and biomaterials, cellular and tissue engineering, biomedical sensing and imaging, human factors and performance engineering, neuroengineering, and bioinformatics. Students without an academic background in engineering or physical science who wish to enter the biomedical engineering program may enroll in the Crossover Program.

The core courses in the Biomedical Science program are designed to educate life-science students in quantitative analysis, mathematical modeling, systems analysis, and fundamental computational and informatics skills. Students are then encouraged to combine their knowledge of the life sciences with their newly acquired analytical skills to focus in such areas as tissue engineering and/or bioinformatics.

A recent agreement with the Interdepartmental Medical Science Program (http://www.drexelmed.edu/Home/AcademicPrograms/ ProfessionalStudiesintheHealthSciences/Programs/PreMedicalPrograms/ InterdepartmentalMedicalScienceIMSProgram.aspx) at the Drexel College of Medicine allows students to spend one year taking courses at the College of Medicine and their second year at the School of Biomedical Engineering, Science and Health Systems—leading to a Master's degree in Biomedical Science.

A non-thesis MS degree is available to non-traditional students seeking advanced studies in biomedical engineering and biomedical science to enhance their careers.

Admission Requirements

Acceptance for graduate study at Drexel's School of Biomedical Engineering, Science and Health Systems requires a four-year bachelor's degree from an accredited institution in the United States or equivalent international institution. Regular acceptance requires a minimal cumulative grade point average of 3.0 (B) on a 4.0 scale for the last two years of undergraduate work, and for any graduate level work undertaken.

Drexel's School of Biomedical Engineering, Science and Health Systems normally requires a TOEFL score of at least 260. Verbal, analytical, and quantitative scores on the GRE General Test are recommended for admission and are required for financial assistantship consideration.

The School practices a rolling admissions policy--students are able to apply at any term during the year, but students are encouraged to matriculate in the fall to ensure proper sequence of coursework.

In addition to the School's requirements, students must satisfy the requirements of the Office of Research and Graduate Studies in matters such as academic standing, thesis, examinations, and time limits.

Students without an academic background in engineering or physical science should review information about the Crossover Program. (http://www.biomed.drexel.edu/content_frame_v2.cfm? DISPLAYED_CONTENT=academics&DISPLAYED_SUBCONTENT=academic-programs/ #crossover)

Financial Assistance

Financial support for qualified students pursuing studies toward the MS and PhD degrees is available in the form of research assistantships, teaching assistantships, graduate assistantships, and fellowships.

Calhoun Graduate Assistantships are supported by the School's Calhoun Endowment. To be considered for a fellowship, students must submit

GRE scores along with all their application materials. The application deadline is February 28 for the following academic year. For more information, please contact Dr. Rami Seliktar (seliktar@coe.drexel.edu).

Dean's Fellowships are available for outstanding applicants to the School when other forms of financial assistance are not available. This Fellowship provides approximately 40% of a student's tuition for the first year and is renewable depending on the student's academic performance. Fellowship applicants must be seeking full-time study only at the master's level. Other requirements include a GPA of 3.5 or better in their bachelor's program and submission of GRE scores. For international students, a TOEFL score of 260 or better is required. For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/isss/NewStudent.html) page.

For further assistance, students should contact the Office of Graduate Admissions (http://www.drexel.edu/em/grad).

All applicants will automatically be considered for departmental assistantships. There is no additional paperwork to apply. Applicants interested in graduate assistantships must submit GRE scores. These awards are based on academic merit.

About Graduate Co-op

Drexel University's long tradition in the field of experiential learning has now been extended into many of its master's programs in science, business, and engineering.

This option, called Graduate Co-op (http://www.drexel.edu/scdc/co-op/graduate/requirements), provides students with the opportunity to gain work experience directly related to their career goals while earning academic credit. Students who have earned a minimum of 24 credits with a GPA of at least 3.0 are eligible to participate. Employment typically lasts six months, during which students enroll in a special 3 credit GCP course coinciding with their term of employment. Students gain work experience while earning salaries. It is important to note that the GCP program does not guarantee a job. It is a market-driven process for the candidates as well as employers. GCP provides the tools and contacts; the student must qualify for the job on the basis of merit, qualifications, and skills.

Further information on the GCP program is available at the Drexel Steinbright Career Development Center. (http://www.drexel.edu/scdc)

Advanced Certificate in Bioinformatics

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 23.5
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 26.1103
Standard Occupational Classification (SOC) Code: 15-1111

The certificate in bioinformatics program emphasizes a systems engineering approach to provide a foundation in systems biology and pathology informatics. Students are provided with hands-on experience in the application of genomic, proteomic, and other large-scale information to biomedical engineering as well as experience in advanced computational

methods used in systems biology: pathway and circuitry, feedback and control, cellular automata, sets of partial differential equations, stochastic analysis, and biostatistics.

Required Courses

BMES 543	Quantitative Systems Biology	4.5
BMES 544	Genome Information Engineering	4.5
BMES 545	Biosystems Modeling	4.5
BMES 546	Biocomputational Languages	4.0
BMES 551	Biomedical Signal Processing	3.0
BMES 604	Pharmacogenomics	3.0
Total Credits		**23.5**

Advanced Certificate in Biomedical Technology Development

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 24.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 15.0401
Standard Occupational Classification (SOC) Code: 17-3029

This certificate program is designed for working engineers interested in medical devices and technology. Students enrolled in this program will develop an understanding of the critical regulatory, economic, and legal issues in addition to the project management skills that facilitate the development of new medical devices.

Required Courses

BMES 501	Medical Sciences I	3.0
BMES 502	Medical Sciences II	3.0
BMES 503	Medical Sciences III	3.0
BMES 509	Entrepreneurship for Biomedical Engineering and Science	3.0
BMES 534	Design Thinking for Biomedical Engineers	3.0
BMES 538	Biomedical Ethics and Law	3.0
BMES 588	Medical Device Development	3.0
BMES 590	Clinical Rotation	3.0
Total Credits		**24.0**

Advanced Certificate in Tissue Engineering

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 20.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 14.0501
Standard Occupational Classification (SOC) Code: 17-2031

The certificate in tissue engineering is designed to provide advanced training in cellular and molecular biology relevant to tissue engineering and behavior of materials used in biomedical applications.

Required Courses

BMES 631	Tissue Engineering I	4.0
BMES 632	Tissue Engineering II	4.0
BMES 660	Biomaterials I	4.0
BMES 661	Biomaterials II	4.0
BMES 675	Biomaterials and Tissue Engineering III	4.0
Total Credits		**20.0**

Biomedical Engineering

Major: Biomedical Engineering
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0-51.0 (MS) or 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 14.0501
Standard Occupational Classification (SOC) code: 17-2031

About the Program

The curriculum develops graduates who can identify and address unmet clinical, diagnostic, and healthcare needs by using their knowledge of modern theories, engineering systems, and mathematical and engineering tools. Biomedical engineers require the analytical tools and broad knowledge of modern engineering and science, fundamental understanding of the biological or physiological system, and familiarity with recent technological breakthroughs.

Master students can choose to include a 6 months graduate co-op cycle as part of their studies. Students may also choose to enroll in a concentration in Biomedical Device Development, or specialize in biomaterials and tissue engineering, biomechanics, neuroengineering, imaging and devices or bioinformatics, or may pursue a dual-degree MS option. Graduating students work in industry in such fields as medical devices, health care, pharmaceuticals and biotechnology, continue academic careers (PhD), or continue to medical schools.

Additional Information

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For more information, visit the The School of Biomedical Engineering, Science, and Health Systems (http://www.biomed.drexel.edu) website.

Master of Science Degree Requirements

The core requirements for the master's in biomedical engineering encompass approximately 45.0 course credits (most courses carry three

credits each). Students who choose the non-thesis option must take 51.0 credits of coursework and cannot register for thesis or research credits.

The curriculum includes room for specialization in several areas of biomedical engineering, as well as a concentration in biomedical technology development.

Core Courses

BMES 501	Medical Sciences I	3.0
BMES 502	Medical Sciences II	3.0
BMES 503	Medical Sciences III	3.0
BMES 672	Biosimulation I	3.0
BMES 673	Biosimulation II	3.0
BMES 864	Seminar	0.0

Electives

The sum of electives, core credits, and/or thesis credits must total 45.0 for thesis students and 51.0 for non-thesis students. Elective choices would depend upon the student's area(s) of focus or concentration.

Thesis

BMES 897	Research	1.0-12.0
BMES 898	Master's Thesis [*]	0.5-20.0

*   The research for the thesis may include work carried out during an internship.

Biomedical Technology Development Concentration

Students enrolled in this concentration will develop an understanding of critical regulatory, economic, and legal issues in addition to the project management skills that facilitate the development of new medical devices and positive working relationships with intellectual property lawyers, insurance companies, and the federal government.

Core Courses

BMES 509	Entrepreneurship for Biomedical Engineering and Science	3.0
BMES 534	Design Thinking for Biomedical Engineers	3.0
BMES 538	Biomedical Ethics and Law	3.0
BMES 588	Medical Device Development	3.0
BMES 590	Clinical Rotation	3.0
Total Credits		**15.0**

PhD in Biomedical Engineering Degree Requirements

To be awarded the PhD degree, students must complete 90.0 required credits and fulfill the one-year residency requirement.
The following milestones have to be satisfied during the course of the program:

- Students must successfully pass the candidacy examination.
- Students must submit a PhD dissertation proposal and successfully defend it.
- Students must write a dissertation and successfully pass final oral defense.

Post-Baccalaureate Requirements and Post-Master's Requirements

Both post-baccalaureate and post-master's students are admitted into the doctoral program in Biomedical Engineering, but have slightly differing sets of requirements.

For **post-master's students**, 45.0 of the credits that they earned toward their Master's degree may be applied toward the PhD. If coming from the Master's program in Biomedical Engineering at Drexel University, those courses they took would apply. For non-Drexel students who have completed their master's elsewhere, there may be exceptions made. If these students believe that they have covered the material of the required courses in another program, they must show evidence of such material and obtain a formal waiver of this requirement from the Graduate Advisor.

For **post-baccalaureate students**, students must complete a minimum of 90.0 credits and a research thesis. These 90.0 credits include the core courses required by Drexel's MS in Biomedical Engineering.

Core Courses

BMES 501	Medical Sciences I	3.0
BMES 502	Medical Sciences II	3.0
BMES 503	Medical Sciences III	3.0
BMES 672	Biosimulation I	3.0
BMES 673	Biosimulation II	3.0
BMES 864	Seminar	0.0

In addition to the required courses, post-baccalaureate PhD students must take at least 21.0 more credits in courses. This balance may be taken as research and/or thesis/dissertation credits.

Thesis Advisor/Plan of Study

During the first year of the program all Doctoral students are required to identify a Thesis Advisor and complete a plan of study. The student's Thesis Advisor and the Graduate Advisor will guide the student in developing this plan of study. Each plan of study is individually tailored to the student, and includes a combination of research and course credits most beneficial and complimentary to the student's chosen thesis topic.

The Candidacy Examination

Doctoral students must successfully pass a candidacy examination, preferably at the end of the first year of their study.
The overall objective of the candidacy examination is to test the student's basic knowledge and preparedness to proceed toward a PhD in Biomedical Engineering. After a satisfactory performance on the candidacy examination the student is awarded the Doctoral Candidate status. Candidates must submit a Thesis Proposal by the end of the second year and defend it in an oral presentation to a committee of five faculty members.

Thesis Defense

After the student has successfully completed all the necessary research and composed a thesis manuscript, in accordance with the guidelines specified by the Office of Research and Graduate Studies, he or she then must formally defend their thesis. A formal thesis defense includes an oral presentation of research accomplishments in front of a committee of faculty members. The thesis defense is open to the general public.

Prospective PhD students are welcome to contact the school to discuss their research interests. For a more detailed description of the PhD requirements, please visit the School of Biomedical Engineering and Health Systems' Biomedical Engineering (http://www.biomed.drexel.edu/new04) web site.

Areas of Specialization

Areas of specialization can be pursued within the Biomedical Engineering graduate program. Students can plan their own focus area that will give them strength in a particular sub-discipline. Alternatively, the student can specialize by conducting research and writing a thesis.

Biomaterials and Tissue Engineering
Biomaterials and tissue engineering is designed to provide students with advanced training in cellular and molecular biology relevant to tissue engineering and behavior of materials used in biomedical applications.

Biomedical Technology Development
Students pursuing the concentration will develop an understanding of critical regulatory, economic, and legal issues in addition to the project management skills that facilitate the development of new medical devices and positive working relationships with intellectual property lawyers, insurance companies, and the federal government. (This is a formal concentration with specific course requirements.)

Bioinformatics
Bioinformatics emphasizes a systems engineering approach to provide a foundation in systems biology and pathology informatics. Students are provided with hands-on experience in the application of genomic, proteomic, and other large-scale information to biomedical engineering as well as experience in advanced computational methods used in systems biology: pathway and circuitry, feedback and control, cellular automata, sets of partial differential equations, stochastic analysis, and biostatistics.

Biomechanics and Human Performance Engineering
Biomechanics and human performance engineering is designed to meet two objectives: to acquaint students with the responses of biological tissues to mechanical loads as well as with the mechanical properties of living systems and to provide students with the background and skills needed to create work and living environments which improve human health and enhance performance. Biomechanics and human performance also involves the study of orthopedic appliances and the broader aspect of rehabilitation engineering and the management of disability.

Biomedical Systems and Imaging
Biomedical systems and imaging focuses on the theoretical and practical issues related to machine vision, image processing and analysis, and signal processing associated with such medical applications as well biomedical instrumentation and product development.

Neuroengineering
Neuroengineering is broadly defined to include the modeling of neural and endocrine systems, neural networks, complexity in physiological systems, evolutionary influences in biological control systems, neurocontrol, neurorobotics, and neuroprosthetics.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD *(University of Pennsylvania)*. Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD *(Wayne State University)*. Assistant Professor. Structural characteristics of the pediatric thoracic cage using CT scans and developing an age-equivalent animal model for pediatric long bones.

Kenneth A. Barbee, PhD *(University of Pennsylvania)*. Professor. Cellular biomechanics of neural and vascular injury, mechanotransduction in the cardiovascular system, mechanical control of growth and development for wound healing and tissue engineering.

Lin Han, PhD *(Massachusetts Institute of Technology)*. Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD *(Hebrew University of Jerusalem, Israel)*. Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens, computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD *(University of Pennsylvania)*. Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD *(University of Pennsylvania) Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Andres Kriete, PhD *(University in Bremen Germany) Associate Director for Graduate Studies and Academic Operations*. Systems biology, bioimaging, control theory, biology of aging, skin cancer.

Ryszard Lec, PhD *(University of Warsaw Engineering College)*. Professor. Biomedical applications of visoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Peter Lewin, PhD *(University of Denmark, Copenhagen-Lyngby) Richard B. Beard Professor, School Of Biomedical Engineering, Science & Health Systems*. Professor. Biomedical ultrasonics, piezoelectric and polymer transducers and hydrophones; shock wave sensors.

Hualou Liang, PhD *(Chinese Academy of Sciences)*. Associate Professor. Neuroengineering, neuroinformatics, cognitive and computational neuroscience, neural data analysis and computational modeling, biomedical signal processing.

Donald L. McEachron, PhD *(University of California at San Diego) Associate Director*. Research Professor. Animal behavior, autoradiography, biological rhythms, cerebral metabolism, evolutionary theory, image processing, neuroendocrinology.

Karen Moxon, PhD *(University of Colorado)*. Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Banu Onaral, Ph.D. *(University of Pennsylvania) H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD *(Rensselaer Polytechnic University)*. Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

Arye Rosen, PhD *(Drexel University) Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Ahmet Sacan, PhD *(Middle East Technical University)*. Assistant Professor. Indexing and data mining in biological databases; protein sequence and structure; similarity search; protein structure modeling; protein-protein interaction; automated cell tracking.

Joseph J. Sarver, PhD *(Drexel University)*. Teaching Professor. Neuromuscular adaptation to changes in the myo-mechanical environment.

Rahamim Seliktar, PhD *(University of Strathclyde, Glasgow) Vice Director, School of Biomedical Engineering, Science & Health Systems*. Professor. Limb prostheses, biomechanics of human motion, orthopedic biomechanics.

Adrian C. Shieh, PhD *(Rice University)*. Assistant Professor. Contribution of mechanical forces to tumor invasion and metastasis, with a particular emphasis on how biomechanical signals may drive the invasive switch, and how the biomechanical microenvironment interacts with cytokine signaling and the extracellular matrix to influence tumor and stromal cell behavior.

Wan Young Shih, PhD *(Ohio State University) School of Biomedical Engineering, Science and Health Systems*. Associate Professor. Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Kara Spiller, PhD *(Drexel University)*. Assistant Professor. Cell-biomaterial interactions, biomaterial design, and international engineering education.

Aydin Tozeren, PhD *(Columbia University) Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Margaret Wheatley, PhD *(University of Toronto) School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor*. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Yinghui Zhong, PhD *(Georgia Institute of Technology)*. Assistant Professor. Spinal cord repair, and engineering neural prosthesis/brain interface using biomaterials, drug delivery, and stem cell therapy.

Interdepartmental Faculty

Douglas L. Chute, PhD *(University of Missouri) Louis and Bessie Stein Fellow*. Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Patricia A. Shewokis, PhD *(University of Georgia)*. Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalography (EEG) and methodology and research design.

Emeritus Faculty

William Freedman, PhD *(Drexel University)*. Professor Emeritus. Motor control; sensory and motor systems; reflexes; eye movements; neural networks.

John M. Reid, PhD *(University of Pennsylvania) Calhoun Professor Emeritus*. Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD *(Cornell University)*. Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Biomedical Science

Major: Biomedical Science
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0-51.0 (MS) or 90.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0102
Standard Occupational Classification (SOC) code: 19.1042

About the Program

The Biomedical Science program at the School of Biomedical Engineering, Science and Health Systems applies fundamental biological research, analysis and technology to human health. The program educates students whose undergraduate education is in basic life sciences (e.g., biology) or paramedical disciplines in quantitative data analysis, mathematical modeling, systems analysis and informatics.

For students entering with degrees in physics, mathematics, and/or computer science, the School, in close collaboration with the Department of Biology, provides the coursework needed to acquire proficiency in the life sciences.

Master students can choose to include a 6 months co-op cycle as part of their studies. Students may also choose to enroll in concentrations such as as biomedical technology development, biomaterials and tissue engineering, or bioinformatics. They can also specialize in neuroengineering, biomechanics or imaging and devices. Students who graduate with a master's degree from the biomedical science program often continue clinical training in medicine, dentistry, or veterinary medicine; pursue further graduate study toward the PhD degree; or work in industry in such fields as health care, pharmaceuticals, biotechnology, medical devices, etc.

The Biomedical Science program has an articulation with Interdepartmental Medical Science (IMS) at the Drexel College of Medicine, which can be pursued after taking one year of required classes. Applicants to the IMS program include students who are late in their decision to apply to medical school, students interested in improving their academic record before applying or re-applying to medical schools, or students who would like a year in a medical school setting before deciding whether medicine is the career for them.

Additional Information

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For more information, visit the The School of Biomedical Engineering, Science, and Health Systems (http://www.biomed.drexel.edu) website.

Master of Science in Biomedical Science Degree Requirements

The core requirements for the master's in biomedical science encompass approximately 45.0 course credits (most courses carry three credits each). Students who choose the non-thesis option must take 51.0 credits of coursework and cannot register for thesis or research credits.

The curriculum includes room for specialization in several areas in biomedical engineering, as well as concentrations in biomaterials and tissue engineering, bioinformatics and biomedical technology development.

Concentrations

Three concentrations are available:

- **Biomaterials and Tissue Engineering**
  Biomaterials and tissue engineering is designed to provide students with advanced training in cellular and molecular biology relevant to tissue engineering and behavior of materials used in biomedical applications.
- **Bioinformatics**
  This specialization emphasized a systems engineering approach to provide a foundation in systems biology and pathology informatics. Students are provided with hands-on experience in the application of genomic, proteomic, and other large-scale information to biomedical engineering as well as experience in advanced computational methods used in systems biology: pathway and circuitry, feedback and control, cellular automata, sets of partial differential equations, stochastic analysis, and biostatistics.
- **Biomedical Technology Development**
  This concentration area aims to provide engineers with the comprehensive education and training necessary to succeed in careers in business, industry, non-profit organizations, and government agencies involving biomedical technology development.

Required Courses

BMES 505	Mathematics for Biomedical Sciences I	3.0
BMES 506	Mathematics for Biomedical Sciences II	3.0
BMES 507	Mathematics for Biomedical Sciences III	3.0
BMES 510	Biomedical Statistics	4.0
BMES 511	Principles of Systems Analysis Applied to Biomedicine I	3.0
BMES 512	Principles of Systems Analysis Applied to Biomedicine II	3.0
BMES 515	Experimental Design in Biomedical Research	4.0
BMES 538	Biomedical Ethics and Law	3.0
BMES 546	Biocomputational Languages	4.0
Electives		15.0-21.0
BMES 897	Research	
BMES 898	Master's Thesis	
Total Credits		**45.0-51.0**

PhD in Biomedical Science Degree Requirements

Students with training in natural science or engineering, as well as individuals with academic or professional degrees in the medical science disciplines will be considered for admission to the doctoral program.

To be awarded the PhD degree, students must complete 90.0 required credits and fulfill a one-year residency requirement.

The following milestones have to be satisfied during the course of the program:

- Students must successfully pass the candidacy examination.
- Students must submit a PhD dissertation proposal and successfully defend it.
- Students must write a dissertation and successfully pass final oral defense.

Post-Baccalaureate Requirements and Post-Master's Requirements

Both post-baccalaureate and post-master's students are admitted into the doctoral program in Biomedical Science, but have slightly differing sets of requirements.

For **post-master's students**, 45.0 of the credits that they earned toward their Master's degree may be applied toward the PhD. If coming from the Master's program in Biomedical Science at the School of Biomedical Engineering, those courses they took would apply.

For **post-baccalaureate students**, students must complete a minimum of 90.0 credits and a research thesis. These 90.0 credits include the core courses required by Drexel's MS in Biomedical Science.

In addition to the required courses, post-baccalaureate PhD students must take at least 21.0 more credits in courses. This balance may be taken as research and/or thesis/dissertation credits.

Thesis Advisor/Plan of Study

During the first year of the program all Doctoral students are required to identify a Thesis Advisor and complete a plan of study. The student's Thesis Advisor and the Graduate Advisor will guide the student in developing this plan of study. Each plan of study is individually tailored to the student, and includes a combination of research and course credits most beneficial and complimentary to the student's chosen thesis topic.

The Candidacy Examination

Doctoral students must successfully pass a candidacy examination, preferably at the end of the first year of their study.

The overall objective of the candidacy examination is to test the student's basic knowledge and preparedness to proceed toward a PhD in Biomedical Science. After a satisfactory performance on the candidacy examination the student is awarded the Doctoral Candidate status. Candidates must submit a Thesis Proposal by the end of the second year and defend it in an oral presentation to a committee of five faculty members.

Thesis Defense

After the student has successfully completed all the necessary research and composed a thesis manuscript, in accordance with the guidelines specified by the Office of Research and Graduate Studies, he or she then

must formally defend their thesis. A formal thesis defense includes an oral presentation of research accomplishments in front of a committee of faculty members. The thesis defense is open to the general public.

Prospective PhD students are welcome to contact the school to discuss their research interests. For a more detailed description of the PhD requirements, please visit the School of Biomedical Engineering and Health Systems' Biomedical (http://www.biomed.drexel.edu/new04) Science (http://www.biomed.drexel.edu/new04/Content/grad_prog/academic_programs/Biomedical_Science) web site.

For more information, visit the School's web site and click on Graduate Programs (http://www.biomed.drexel.edu/new04/Content/grad_prog/academic_programs).

Interdepartmental Medical Science Pathway to the MS in Biomedical Science

The School of Biomedical Engineering, Science and Health Systems collaborates with the Drexel College of Medicine, specifically with the Interdepartmental Medical Science Program (IMSP) (p. 70), to offer a unique pathway to a Masters in Biomedical Science. Students complete 1 year in the IMS program (described below) and then complete their second year at the School. This involves completing the core sequence and a thesis or taking a non-thesis option with additional coursework.

Interdepartmental Medical Science Program Curriculum
The IMS curriculum involves a full-time commitment to rigorous coursework with strong academic requirements. Six major medical school courses are taken simultaneously with the College of Medicine first-year class. These include Medical Biochemistry, Cell Biology & Microanatomy, Medical Physiology, Medical Nutrition, Medical Immunology, and Medical Neuroscience.

The students take the exact same courses and exams as the medical students and are evaluated based on their performance in comparison to our medical school students. Performance on tests, quizzes, and assignments equal to the mean grade of the medical school class signifies a letter grade of "B" for the IMS students. Thus, IMS students receiving A's and B's are performing at the top 50% of the medical school class and can then present themselves with strong academic credentials before the admissions committee. This permits medical school admissions committees to directly evaluate the student's competence compared with their own first year medical school class. This allows students an opportunity to test their preparation, motivation, and commitment to medicine.

In addition to the medical school courses, students take a medical ethics course each semester. The campuses are approximately five miles apart and a University shuttle provides free transportation between the two.

Additionally, course conferences and laboratory components for IMS students are conducted at the Health Sciences Campus where the program is based. The IMS curriculum allows exposure to both medical school lectures and individual attention from medical school professors in small group conferences.

For more information, visit Drexel's College of Medicine's Interdepartmental Medical Science Program (http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/InterdepartmentalMedicalScienceIMSProgram/Curriculum.aspx) web page.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD *(University of Pennsylvania).* Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD *(Wayne State University).* Assistant Professor. Structural characteristics of the pediatric thoracic cage using CT scans and developing an age-equivalent animal model for pediatric long bones.

Kenneth A. Barbee, PhD *(University of Pennsylvania).* Professor. Cellular biomechanics of neural and vascular injury, mechanotransduction in the cardiovascular system, mechanical control of growth and development for wound healing and tissue engineering.

Lin Han, PhD *(Massachusetts Institute of Technology).* Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD *(Hebrew University of Jerusalem, Israel).* Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens, computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD *(University of Pennsylvania).* Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD *(University of Pennsylvania) Calhoun Distinguished Professor of Engineering in Medicine.* Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Andres Kriete, PhD *(University in Bremen Germany) Associate Director for Graduate Studies and Academic Operations.* Systems biology, bioimaging, control theory, biology of aging, skin cancer.

Ryszard Lec, PhD *(University of Warsaw Engineering College).* Professor. Biomedical applications of visoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Peter Lewin, PhD *(University of Denmark, Copenhagen-Lyngby) Richard B. Beard Professor, School Of Biomedical Engineering, Science & Health Systems.* Professor. Biomedical ultrasonics, piezoelectric and polymer transducers and hydrophones; shock wave sensors.

Hualou Liang, PhD *(Chinese Academy of Sciences).* Associate Professor. Neuroengineering, neuroinformatics, cognitive and computational neuroscience, neural data analysis and computational modeling, biomedical signal processing.

Donald L. McEachron, PhD *(University of California at San Diego) Associate Director.* Research Professor. Animal behavior, autoradiography, biological rhythms, cerebral metabolism, evolutionary theory, image processing, neuroendocrinology.

Karen Moxon, PhD *(University of Colorado)*. Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Banu Onaral, Ph.D. *(University of Pennsylvania) H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems.* Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD *(Rensselaer Polytechnic University)*. Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

Arye Rosen, PhD *(Drexel University) Biomedical Engineering and Electrical Engineering.* Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Ahmet Sacan, PhD *(Middle East Technical University)*. Assistant Professor. Indexing and data mining in biological databases; protein sequence and structure; similarity search; protein structure modeling; protein-protein interaction; automated cell tracking.

Joseph J. Sarver, PhD *(Drexel University)*. Teaching Professor. Neuromuscular adaptation to changes in the myo-mechanical environment.

Rahamim Seliktar, PhD *(University of Strathclyde, Glasgow) Vice Director, School of Biomedical Engineering, Science & Health Systems.* Professor. Limb prostheses, biomechanics of human motion, orthopedic biomechanics.

Adrian C. Shieh, PhD *(Rice University)*. Assistant Professor. Contribution of mechanical forces to tumor invasion and metastasis, with a particular emphasis on how biomechanical signals may drive the invasive switch, and how the biomechanical microenvironment interacts with cytokine signaling and the extracellular matrix to influence tumor and stromal cell behavior.

Wan Young Shih, PhD *(Ohio State University) School of Biomedical Engineering, Science and Health Systems.* Associate Professor. Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Kara Spiller, PhD *(Drexel University)*. Assistant Professor. Cell-biomaterial interactions, biomaterial design, and international engineering education.

Aydin Tozeren, PhD *(Columbia University) Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems.* Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Margaret Wheatley, PhD *(University of Toronto) School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor.* Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Yinghui Zhong, PhD *(Georgia Institute of Technology)*. Assistant Professor. Spinal cord repair, and engineering neural prosthesis/brain interface using biomaterials, drug delivery, and stem cell therapy.

Interdepartmental Faculty

Douglas L. Chute, PhD *(University of Missouri) Louis and Bessie Stein Fellow.* Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Patricia A. Shewokis, PhD *(University of Georgia)*. Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy(fNIR) and electroencephalograpy (EEG) and methodology and research design.

Emeritus Faculty

William Freedman, PhD *(Drexel University)*. Professor Emeritus. Motor control; sensory and motor systems; reflexes; eye movements; neural networks.

John M. Reid, PhD *(University of Pennsylvania) Calhoun Professor Emeritus.* Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD *(Cornell University)*. Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Certificate in Medical Product Design and Device Development

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 14.0501
Standard Occupational Classification (SOC) Code: 17-2031

Over the past 50 years, the practice of medicine has become increasingly driven by technological innovations. However, simply being able to design and develop a new technology is no guarantee that the technology will reach its intended audience, whether that audience be made of medical professionals or patients. To reach the goal of introducing a medical technology into the marketplace, a biomedical engineer must run the gauntlet of regulations, attitudes, and financial considerations that make up the United States health care system.

Medical devices are subject to extensive FDA regulations. Thus, biomedical engineers who design medical technologies must be proficient in the regulatory and economic components of introducing a new medical device into the US health market. Knowledge of intellectual property law is also a prerequisite for those who plan to develop novel medical technologies. Because the cost of obtaining FDA is steep, obtaining intellectual property protection for extended periods of time is necessary to recovering project costs. Along similar lines, biomedical engineers must also appreciate the role of Medicare and other insurers and their requirements for reimbursement.

This certificate program is designed to prepare biomedical engineers to understand the environment into which their innovations will be placed and the users who will interact with them. Professionals enrolled in the

certificate will develop an understanding of critical regulatory, economic, and legal issues in addition to the project management skills that facilitate the development of new medical devices and positive working relationships with intellectual property lawyers, insurance companies, and the federal government.

Required Courses

BMES 509	Entrepreneurship for Biomedical Engineering and Science	3.0
BMES 538	Biomedical Ethics and Law	3.0
BMES 588	Medical Device Development	3.0
BMES 821	Medical Instrumentation	3.0
Select one of the following:		3.0
BMES 520	Introduction to Medical Science	
BMES 822	Medical Instrumentation II	
Total Credits		**15.0**

Additional Information

For addition information, please contact Carolyn Riley (Professional Programs, cr63@drexel.edu) or Professor Kambiz Pourrezaei (Program Coordinator, pourrezk@drexel.edu).

The School of Education

The School of Education (http://www.drexel.edu/soe) seeks to enrich knowledge and practice related to lifespan learning, based on the most current and appropriate research and practice. The School's goal is to improve human understanding through programs and activities that emphasize creative uses of human effort, technology, leadership, and problem solving.

This department offers an extensive and comprehensive array of diverse graduate, doctoral, and certificate programs that encompass all aspects of the educational field. These programs prepare non-traditional students for a variety of careers in human resource development, higher education, global and international education, learning technologies, educational administration, policy and leadership.

The School also offers Pennsylvania Department of Education-approved programs to certify students who already hold bachelor's degrees to be teachers in elementary education (grades PreK-4 with an emphasis on mathematics, science, and technology), secondary education (in biology, chemistry, earth and space science, English, general science, mathematics, physics or social studies), and K-12 (environmental education,instructional technology specialist, and library science). Special education, teaching English as a second language, principal and superintendent certifications are also available. Individuals who complete the minimum requirements receive a PA Instructional I teaching certificate and have the option to continue coursework to fulfill requirements in the graduate Science of Instruction or teaching learning and curriculum (initial certification track) master's degree programs.

Other master's degree programs are also available to those who already have teacher certification and/or do not wish to obtain a teaching certificate. Students who would like to pursue the teaching English as a second language, special education, principal or superintendent certification must already have Pennsylvania Instructional I certification, satisfactory professional school experience on a state-issued certificate appropriate for the assignment, or appropriate equivalent.

Majors

- Applied Behavior Analysis (MS) (p. 363)
- Creativity and Innovation (MS) (p. 365)
- Education Improvement and Transformation (MS) (p. 366)
- Educational Administration (MS) (p. 368)
- Educational Leadership and Management (EdD) (p. 359)
- Educational Leadership Development and Learning Technology (PhD) (p. 391)
- Global and International Education (MS) (p. 372)
- Higher Education (MS) (p. 375)
- Human Resource Development (MS) (p. 378)
- Learning Technologies (MS) (p. 380)
- Mathematics Learning and Teaching (MS) (p. 383)
- Special Education (MS) (p. 385)
- Teaching, Learning and Curriculum (MS) (p. 388)

Certificates

- Adult Education (p. 354)
- Advanced Teaching/Curriculum (p. 353)
- Applied Behavior Analysis (p. 394)
- Autism Spectrum Disorders (p. 354)
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- Learning in Game-Based Systems Environments (p. 357)
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- Multisensory Reading Instruction Level I (p. 391)
- Museum Education (p. 358)
- School Principal Certificate (p. 401)
- Post-Baccalaureate Teaching: Elementary (p. 396)
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- Reading Specialist Certification (p. 400)
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- Special Education PreK-8 (p. 397)
- Special Education Leadership (p. 395)
- STEM Education Certificate (p. 400)
- Student Development and Affairs (p. 359)
- Teaching Certificate: Graduate Intern Program (p. 362)
- Teaching English as a Second Language (p. 402)

Resource Centers

The centers at the School of Education represent a variety of educational, professional, and public service divisions. Each distinct entity provides programming, services and, resources designed to creatively meet your individual needs.

The Center for the Prevention of School-Aged Violence promotes public awareness about the need for youth-focused, evidence-based efforts aimed at preventing youth violence and the social and cognitive skills young people need to prevent violence on their own.

The Evaluation Research Network is a community of experienced researchers, committed to developing and implementing effective strategies and technologies for assessing and evaluating instruction and educational programs.

The Math Forum is the leading online resource for improving math learning, teaching, and communications since 1992.

The Torrance Center for Creative Studies was established as an outgrowth of the research of E. Paul Torrance, internationally renowned authority on creativity. The Center's primary purpose is the identification and nurturance of creative potential. For more information, please call Dr. Fredricka Reisman at 215.895.6771 or email freddie@drexel.edu.

Advanced Teaching/Curriculum Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 18.0

Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1399
Standard Occupational Classification (SOC) Code: 11-9039

The Advanced Teaching/Curriculum Certificate program (ATCC) meets the needs of in-service teachers in a variety of educational settings who seek advanced knowledge beyond that required for initial teacher certification in the areas of effective instruction, curriculum and assessment.

Upon completion of the ATCC, candidates will possess knowledge of the many facets of education.

- In-depth understanding of varying educational organizations and sectors
- Expertise in developing, analyzing, implementing and evaluating instructional strategies
- Ability to exhibit leadership
- Organizational, cross cultural, interpersonal, advocacy, and communication skills

In addition, the ATCC program will provide candidates opportunities to explore a variety of other roles in an educational setting including:

- Instructional leaders both in and beyond the classroom
- Researchers in local, state, national, or international organizations
- Professionals in foundations, associations, corporations, and private education institutions.

EDUC 530	Advanced Techniques in Instruction & Assessment	3.0
EDUC 533	Designing Virtual Communities	3.0
EDUC 537	Learning Disabilities II	3.0
EDUC 608	The Intercultural Learner	3.0
EDUC 714	Instructional and Curriculum Leadership	3.0
EDUC 813	Educational Issues Seminar	3.0
Total Credits		**18.0**

The program is administered through Drexel University Online. For the most current admission information, please visit www.drexel.com (http://www.drexel.com/online-degrees/education-degrees/cert-pbt).

Certificate in Adult Education

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1201
Standard Occupational Classification (SOC) Code: 25-3011

The certificate in adult education prepares students to develop curricular and instructional strategies focused on the unique needs and characteristics of adult learners. The planned program will utilize authentic problems to address and solve including a practicum in an adult education situation.

The certificate will include six courses focused on the theoretical foundations, research and professional practice of adult education. The certificate will offer applicable course and fieldwork opportunities for students pursuing careers in a variety of professional settings, including, but not limited to education, business and health care.

Requirements

EDAE 601	Foundations of Adult Education	3.0
EDAE 602	Adult Learning and Development	3.0
EDAE 603	Program Planning: Assessment & Evaluation of Adult Education	3.0
EDAE 604	Instructional Design and Delivery Strategies	3.0
EDAE 605	Instructional Skills for Teaching Adults Online	3.0
EDAE 606	Transformative Learning in Practice: Practicum in Adult Education	3.0
Total Credits		**18.0**

Certificate in Autism Spectrum Disorders

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 16.5
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.1013
Standard Occupational Classification (SOC) Code: 25-2059

Within the past decade, the number of children diagnosed with an Autism Spectrum Disorder (ASD) has increased drastically. Consequently, the need for professionals trained in this specialized area has significantly increased. This course sequence is designed for those who seek additional expertise in this critical-need area. Students who complete the graduate-level Certificate in Autism Spectrum Disorders are equipped with the fundamental skills, knowledge, teaching methods, interventions, and supports needed to work with students with ASD who have varying profiles.

The program is a part-time graduate program consisting of 5 courses (16.5 credits). Teacher certification is not a requirement for admission to this program, however applicants are expected to have completed a bachelor's degree. Upon completion of the program, students with an active PA Instructional I or Instructional II teaching certificate are eligible for the Pennsylvania Department of Education Autism Spectrum Disorders Endorsement.

Admission Requirements

Students applying to this program should have the following:

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA).
- Completed graduate school application.

- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation - professional or academic.
- An essay describing why the applicant is interested in pursuing graduate study in this field.

Introductory Course

EDEX 551	Teaching Students with Autism Spectrum Disorder (pre-requisite for core courses)	4.5
Core Courses		
EDEX 556	Characteristics & Methods: Autism	3.0
EDEX 558	Characteristics & Methods: High Functioning Autism	3.0
EDEX 560	Communication & Language Interventions: Autism Spectrum Disorders	3.0
EDEX 562	Behavior & Sensory Support: Autism Spectrum Disorders	3.0
Total Credits		**16.5**

A field component is required in each course.

Additional Information:

For more information about this program, contact the program manager:

Owen Schugsta
School of Education
Drexel University
215.895.1690
ocs23@drexel.edu

Certificate in Community College Administration and Leadership

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.0407
Standard Occupational Classification (SOC) Code: 11-9033

The certificate in community college administration and leadership is an option for students and professionals who have already completed a bachelor's degree and would like to enhance their professional credentials without pursing a master's degree.

Additional Information

For additional information, visit Drexel University's Higher Education, Administration and Leadership (http://drexel.edu/soe/academics/graduate/higher-education) page.

Required Courses

EDHE 500	Foundations of Higher Education	3.0
EDHE 530	Higher Education Law	3.0
ORGB 631	Leading Effective Organizations	3.0
Select three of the following:		9.0

EDHE 634	Proposal Writing & Sponsored Project Management	
EDHE 664	Strategies for Educational Success	
EDHE 668	Transformational Leadership	
EDHE 669	Diversity in Higher Education	
Total Credits		**18.0**

Certificate in Creativity and Innovation

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13-9999
Standard Occupational Classification (SOC) Code: 11-9199

The graduate-level certificate in creativity and innovation provides, in a concentrated format, the most contemporary knowledge and skills needed in this important area for students who do not wish to pursue a master's degree but who would value a credential that demonstrates their learning. Credits from the certificate can be applied toward the MS in Creativity and Innovation (http://www.drexel.com/online-degrees/business-degrees/ms-creativity-innovation).

In a world of increasing complexity, change, and competition, generating new ideas and bringing them to the table is now essential for corporate management. Creativity is multidisciplinary – it is in all professional fields from chemistry to engineering, from education to computer science, and from sociology to business. Successful organizations, in all fields, view creativity as vital and are the ones that instill creativity throughout the organization. The application of creativity skills distinguishes managers who maintain the status quo from leaders who inspire a new direction or vision. By internalizing the spirit of creativity and the principles of creative problem solving, individuals can be transformed into change leaders.

Upon completion of the certificate program, students will have formed an in depth understanding of creativity, enhanced communication, creative problem solving, and how these may be applied to practical situations that further their workplace culture. Participants will use their newly enhanced creative thinking skills to reflect critically on existing workplace practices and express coherent and cogent ideas and suggestions for continuous improvement.

For more information, visit Drexel Online's Graduate Certificate Creativity and Innovation (http://www.drexel.com/online-degrees/business-degrees/grad-cert-creativity) web page.

Requirements

CRTV 501	Foundations in Creativity	3.0
CRTV 502	Tools and Techniques in Creativity	3.0
CRTV 503	Creativity in the Workplace	3.0
CRTV 610	Creativity and Change Leadership	3.0
CRTV 620	Research Methods and Assessment of Creative and Innovative Thinking	3.0

CRTV 630	Global Perspectives on Creativity	3.0
Total Credits		**18.0**

Certificate in E-Learning Leadership

Certificate Level: Graduate
Admission Requirements: Bachelor's
Certificate Type: Graduate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.0501
Standard Occupational Classification (SOC) Code: 25-9011

The graduate certificate in e-learning leadership is designed to meet the needs of today's working professionals across many fields. As the demand for academic programs and courses to be delivered via e-learning continues to grow, the corresponding need for leadership in this important area increases. Similarly, corporations continue to seek leaders to oversee training and development initiatives via e-learning. This certificate provides, in a concentrated format, the most contemporary knowledge and skills needed in this important area for students who do not wish to pursue a master's degree but who would value a credential that demonstrates their learning.

Admission requires a bachelor's degree from an accredited institution. Credits from the certificate in e-learning leadership can be applied toward an MS in Professional Studies (http://www.drexel.com/online-degrees/business-degrees/ms-prof-studies).

Objectives
Upon completion of the program, students will have formed an in-depth understanding of online and distance learning theories and will be able to answer the following questions:

- Which emerging technologies hold greatest promise for enriching learning experiences throughout the educational enterprise?
- What pedagogical strategies should designers embody in instructional materials, including those based on multimedia and those reflected in gaming environments?
- How should educators deploy, manage, and evaluate information and communication technologies in classrooms for optimal educational effects?
- What principles of design and practice should educators incorporate into distributed educational courses and programs?

For more information, visit Drexel Online's Graduate Certificate in E-Learning (http://www.drexel.com/online-degrees/business-degrees/cert-elearning) website.

Requirements

ELL 501	The Purpose and Business of E-Learning	3.0
ELL 502	E-Learning Technologies	3.0
ELL 503	Teaching and Learning Issues in E-Learning	3.0
ELL 504	Learning Technologies & Disabilities	3.0
ELL 604	Design & Delivery of E-Learning I	3.0

ELL 605	Design & Delivery of E-Learning II	3.0
Total Credits		**18.0**

Certificate in Educational Policy

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.0406
Standard Occupational Classification (SOC) Code: 11-9039

The certificate in educational policy examines the concept of "policy" as it relates to education and educational institutions and their governance and practices. Students will learn the factors involved in educational policy-making, including the ethics in policy-making decisions, and the methods for analyzing phenomenon that impact educational policy.

The program is designed to prepare educators of all types in the decision-making process of educational policy development.

Requirements

EDPO 620	Education Policy: Concepts, Issues, and Applications	3.0
EDPO 624	Shaping of American Education Policy: Global Forces	3.0
EDPO 628	American Educational Policy and U.S. Competitiveness	3.0
EDPO 632	Ethics in Educational Policy Making	3.0
EDPO 636	Access & Equity in Educational Policy Making	3.0
EDPO 640	Educational Policy-Making Tactics & Influence	3.0
Total Credits		**18.0**

Certificate in Human Resource Development

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.1005
Standard Occupational Classification (SOC) Code: 13-1151

Note: Effective Summer Term 2015, students are no longer being accepted into this certificate program.

The certificate in human resource development prepares professionals in the field of education with the skills they need to strategically lead human resource development and align organizational learning with organizational goals.

Required Courses

EDHE 660	Principles of Adult Education	3.0
EHRD 500	Foundations of Human Resources Development	3.0
EHRD 600	Organizational Consulting	3.0
EHRD 601	Leading and Evaluating Change	3.0
EHRD 606	Human and Organizational Performance	3.0
EHRD 608	Evaluating the Value & Impact of Human Resource Development Interventions	3.0
Total Credits		**18.0**

Certificate in Instructional Design

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 27.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.0501
Standard Occupational Classification (SOC) Code: 25-9031

The Instructional Design Certificate prepares students to apply the principles, theories, models, tools, and techniques of systematic instructional design in diverse organizational settings. It is appropriate for students from varied professional backgrounds seeking careers that utilize the systematic design and development of effective instruction either in physical facilities, online, or blended environments. This includes individuals preparing to be professional instructional designers, teachers, and other learning design professionals for PK-20 education, adult education, and workplace training. It specifically addresses the needs of the millennial learner and collaborative, networked communities. Students are encouraged to integrate their professional experiences and engage co-learners from other environments in their explorations.

The outcomes of candidates who successfully complete the Instructional Design Certificate will be to:

- create effective learning artifacts using a variety of media and methods including social media via mobile devices;
- design an effective instructional development plan that meets the needs of various stakeholders;
- collaborate with and lead a team of talented contributors to create an instructional product resulting in an effective and efficient outcome;
- design and integrate virtual community processes into learning environments;
- design effective learning experiences for online and blended students using tools and methods specific to these environments;
- apply knowledge from the quickly evolving field of learning science to the design process;
- create effective technology-enhanced instruction that includes analysis, design, development, implementation and evaluation;
- recognize and adapt learning environments, tools, methods, and strategies to engage and optimize learning for disabled populations;
- negotiate an effective instructional design and development initiative that meets the needs of a real client; and

- plan, develop, evaluate, and manage the rapid design/development of effective instructional materials.

Admission Requirements

Applicants for the program will follow the University standards for admission to graduate study. Prospective students must minimally have earned a bachelor's degree from an accredited institution and have an undergraduate GPA of 3.0 or higher to be considered for admission (graduate degree GPAs will be considered along with the undergraduate GPA). In addition, prospective students are required to submit the following:

a) Completed Application Form including official transcripts from all universities or colleges attended
b) Two letters of recommendation
c) Personal essay
d) Resume
e) Application fee

The Program Manager will evaluate the applicant's potential and commitment to succeed in graduate study seeking advice from the Program Director in cases where evidence is not clear. The applicant's potential to contribute to the overall quality of the program of study will also be considered. An Interview/Intake Advisement session will be held for those candidates who pass the initial screening. Decisions will be made using dates corresponding to the regular University schedule for rolling admissions in Graduate Admissions.

Program Requirements

Required Core Courses:

EDLT 532	Designing Virtual Communities for Staff Development - Non-Field Experience	3.0
EDLT 536	Learning Sciences and Instructional Design	3.0
EDLT 550	Introduction to Instructional Design	3.0
EDLT 554	Learning with Social Media and Mobiles	3.0
EDLT 811	Designing and Developing Multimedia Applications For Learning	3.0
ELL 502	E-Learning Technologies	3.0
ELL 504	Learning Technologies & Disabilities	3.0
Required Capstone Courses:		
EDLT 539	EDLT Co-op Seminar Course I	1.5
EDLT 540	EDLT Co-op Seminar Course II	4.5
Total Credits		**27.0**

Certificate in Learning in Game-Based Systems Environments

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 27.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.0501
Standard Occupational Classification (SOC) Code: 25-9031

The certificate in learning in game-based system environments prepares educators to effectively use educational games in and out of the classroom and training center. The program provides an overview of game development processes, enables participants to build basic games, and most importantly, examines how to assess and evaluate the learning experience as it relates to educational games.

The certificate program culminates with a capstone project in which students produce their own basic educational game and subsequently formulate an evaluative process to address its effectiveness.

Required Courses [*]

EDLT 541	Foundations of Game-Based Learning	3.0
EDLT 542	Research in Motivation & Game-based Learning	3.0
EDLT 543	Play & Learning in a Participatory Culture	3.0
EDLT 544	Integrating Games & Pedagogical Content Knowledge	3.0
EDLT 545	Design & Development of Learning Games I	3.0
EDLT 546	Design & Development of Learning Games II	3.0
EDLT 547	Capstone Project I	1.5
EDLT 548	Capstone Project II	4.5
EDUC 535	Researching & Evaluating Instructional Technology	3.0
Total Credits		**27.0**

*Certain courses an be waived if the student has completed equivalent courses in his or her undergraduate education and can demonstrate proficiency.

Certificate in Math Leadership & Coaching

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 20.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1311
Standard Occupational Classification (SOC) Code: 25-1022

Building on the existing offerings of the Mathematics Learning and Teaching Program, this graduate certificate will enable current mathematics teachers and leaders to apply for State-Approved Endorsements in Mathematics Coaching. The program is designed to address the needs of math coaches and leaders for all levels of pre-K-12 education. However, the program's flexible design will allow for students to specialize in preK-12, pre-K-8 or 6-12 mathematics coaching and leadership through appropriate selection of Mathematics Education Core courses.

Mathematics Education Core Courses

Select Two Courses:		6.0
MTED 500	Learning and Teaching Number and Operation	
MTED 501	Proportional and Algebraic Reasoning	
MTED 502	Geometry & Spatial Reasoning	
MTED 503	Data Analysis and Probabalistic & Statistical Reasoning	

MTED 511	Functions through the Curriculum	
Mathematics Coaching and Leadership Core Courses		
MTED 621	Collaborative Instructional Design & Analysis I	3.0
MTED 642	Mathematics Coaching and Leadership	3.0
MTED 643	Practicum in Mathematics Coaching and Leadership	2.0
MTED 651	Problem Solving Strategies	3.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
Total Credits		**20.0**

Certificate in Mathematics Learning & Teaching

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1311
Standard Occupational Classification (SOC) Code: 25-1022

The certificate in mathematics learning and teaching requires the completion of 15.0 credit hours of coursework and is designed to provide mathematics teachers with development opportunities for enhancing the quality of their instruction. Recognizing that many teachers pursue graduate studies while working full-time, the program has been designed such that it can be completed over five quarters (requiring only one course per quarter), and is offered in an online format.

Students in the certificate program take courses alongside those in the MS in Mathematics Learning & Teaching (p. 383). All of the certificate courses can be counted towards MS in Mathematics Learning & Teaching program. Additionally, certificate students may concurrently pursue the MS in Teaching, Learning and Curriculum (p. 388).

Certificate Requirements

Required Course

MTED 601	Diagnosing Student Mathematical Thinking	3.0
Select two of the following:		6.0
MTED 501	Proportional and Algebraic Reasoning	
MTED 502	Geometry & Spatial Reasoning	
MTED 503	Data Analysis and Probabalistic & Statistical Reasoning	
MTED 511	Functions through the Curriculum	
Students select 6.0 additional credits from any 600- 700 level MTED courses.		6.0
Total Credits		**15.0**

Certificate in Museum Education

Certificate Level: Graduate
Admissions Requirements: Bachelor's
Certificate Type: Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Campus

Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1399
Standard Occupational Classification (SOC) Code: 11-9199

The certificate in museum education is specifically designed to prepare professionals directly or indirectly involved with learning in museum settings to meet the challenges of designing and evaluating learning in informal environments.

The coursework covers the necessary tools, experiences, and understanding necessary to design and implement public programs for diverse audiences in the museum environment. Students equipped with this certificate will pursue careers such as education administrators, managers, and exhibit researchers in various foundations, corporations, and associations such as museums, cultural centers, informal education institutions, human services agencies, non-governmental agencies, as well as US government agencies such as the Smithsonian Institution.

The program is a flexible, convenient part-time program and is enhanced by Drexel University's partnership with the Academy of Natural Sciences (http://www.ansp.org).

Required Courses

MUSL 630	Exhibitions and Programming	3.0
MUSM 500	Foundations of Informal Education in Museum Settings	3.0
MUSM 506	Technology in Museum Education	3.0
MUSM 507	Current Research and Evaluation in Museum Design and Learning	3.0
MUSM 508	Meeting the Educational Needs of Diverse Museum Audiences	3.0
MUSM 510	Designing and Evaluating Museum Tours: A Practicum	3.0
Total Credits		**18.0**

Certificate in Student Development and Affairs

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits of Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.0406
Standard Occupational Classification (SOC) Code: 11-9033

The certificate in student development and affairs is an option for students and professionals who have already completed a bachelor's degree and would like to enhance their professional credentials without pursing a master's degree.

Additional Information

For additional information, visit Drexel University's Higher Education, Administration and Leadership (http://drexel.edu/soe/academics/graduate/higher-education) page.

Required Courses

EDHE 500	Foundations of Higher Education	3.0
EDHE 520	Student Development & Customer Service Management	3.0
EDHE 530	Higher Education Law	3.0
Select three of the following:		9.0
EDHE 652	Enrollment Marketing, Recruitment & Retention	
EDHE 662	Critical Issues in Student Affairs	
EDHE 663	Safety and Crisis Management	
EDHE 669	Diversity in Higher Education	
Total Credits		**18.0**

Educational Leadership and Management

Major: Educational Leadership and Management
Degree Awarded: Doctor of Education (EdD)
Calendar Type: Quarter
Total Credit Hours: 60.0
Classification of Instructional Programs (CIP) code: 13-0401
Standard Occupational Classification (SOC) code: 11-9033

About the Program

The Doctor of Education degree in Educational Leadership and Management program is designed to prepare future leaders with the necessary skills and experience for senior administration and management positions.

Students can specialize in Educational Administration (Superintendent Certification), Higher Education, Educational Policy, Human Resource Development, Special Education Leadership, Athletic Administration or Creativity & Innovation. Regardless of chosen concentration, the program focuses equally on the understanding and critical analysis of both practice and theory.

Mission

The mission of the EdD program in Educational Leadership and Management is to prepare graduates with the foremost education and business skills related to administration, management, finance, and strategic planning to successfully lead public school districts, universities and colleges, national foundations and organizations, corporations, and government agencies. The EdD program will prepare graduates for leadership roles in improving educational practice and applying management skills to the field of education.

About the Curriculum

The EdD program incorporates an interdisciplinary approach into the curriculum through the collaborative partnerships. The EdD program integrates education and business practices, skills, knowledge and theory into the curriculum, courses and instructional strategies. Students engaged in best practices, current research, and innovations in technology for enhanced instruction.

Recognizing that all practice has a theoretical dimension and all theory springs from questions identified through practice, the students in the EdD program will critically examine their own practices and the practices of their colleagues from a variety of theoretical perspectives.

The program is offered through a blended delivery system combining both on-campus classes and online education. All on-campus courses have an online component. The other option is a fully online program.

For additional information about this program, visit the School of Education's Graduate (https://webedit.drexel.edu/soe/academics/ graduate) web site.

Admission Requirements

Application Requirements for New Applicants

For details regarding the items below please review the Admission Application Checklist (http://www.drexel.edu/grad/apply/checklist).

- *Transcripts* from all colleges and universities attended verifying completion of a master's degree (with 3.5 GPA or better) in education or an appropriate field and undergraduate degree in an appropriate major
- *Résumé* indicating at least 3 years of work experience relevant to applicant's professional goals
- *Three letters of recommendation:* Use the Electronic Letter of Recommendation (https://deptapp.drexel.edu/em/LOR) form to submit recommendation letters
- *Essay*: Discuss professional goals and aspirations, including how current skills, along with advanced study of educational leadership, will be of support in the attainment of those goals.
- *Writing sample*: Submit a 5- to 30-page writing sample that demonstrates writing abilities and potential success in the program. Examples include, but are not limited to, a journal article, a paper written for a class, or a manual or technical report.
- *Interview*: at the discretion of the application review team.

Supplemental Application Materials for New Applicants
To make your application more competitive, applicants are encouraged to submit two (2) or more of the following items:

- Detailed statement describing sustained Leadership Activities
- Detailed statement describing significant Creative Activities/Products
- Detailed statement describing significant Research Activities/ Publications
- GRE or MAT scores

Additional information about how to apply is available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/ edu/educational-leadership-and-management) website.

Degree Requirements

Students in the EdD program are required to complete core courses including education courses and MBA courses. Students complete courses within their areas of specialization prior to completing required research courses. At that point, students begin the dissertation phase of the EdD program.

EdD Candidacy Requirements

In summary, the sequence of events leading to the EdD candidacy include the following:

- All courses must be passed with a grade of B or better.
- In the fifth quarter, the comprehensive exam must be passed.

- In the ninth quarter, the dissertation proposal must be approved by committee (proposal hearings; filing of the D4 and 4A forms upon approval. At this point students have completed 54.0 of the 60.0 credits required in the program.)
- In terms 10-12, students register for Dissertation. As per the current policy, students pay one credit of tuition but register for multiple credits. A minimum of two credits are needed in the twelfth quarter to accrue the needed 60.0 credits.

Required Courses

Core Courses

BUSN 502	Essentials of Economics	3.0
EDUC 800	Educational Leadership & Change	3.0
EDUC 801	Creative Strategies For Educational Leaders	3.0
EDUC 802	Using and Integrating Learning Technologies	3.0
EDUC 804	Program Evaluation in Organizations	3.0
ORGB 625	Leadership and Professional Development	3.0
Concentration Course Options (See Below)		15.0-16.0
Research Courses		
EDUC 803	Educational Research Design I	3.0
EDUC 810	Educational Research Design II	3.0
EDUC 815	Writing for Research, Publication and Funding in Education	3.0
EDUC 818	Applied Research Study	3.0
EDUC 835	Quantitative Research Methods and Data Analysis	4.0
EDUC 836	Qualitative Research Methods and Data Analysis	4.0
EDUC 881	Doctoral Seminar (EdD)	1.5
EdD Candidacy Courses		
EDUC 998	PhD Dissertation	6.0
Total Credits		**60.5-61.5**

Concentration Course Options

Students and their advisors craft a program concentration that is most appropriate for their needs and background. Concentration availability may depend on campus location as well as other factors. Students should work closely with their advisors at the School of Education.

There are two sets of concentration courses for Higher Education depending on whether or not students are already entering the program with a background in higher education.

Higher Education [*]

EDHE 500	Foundations of Higher Education	3.0
EDHE 510	Governance, Management & Administration in Higher Education	3.0
EDHE 530	Higher Education Law	3.0
EDHE 669	Diversity in Higher Education	3.0
EDGI 506	Comparative Higher Education Systems	3.0
Total Credits		**15.0**

[*] For students entering the program without previous formal study in Higher Education.

Higher Education Concentration (alternative) [**]

EDAE 601	Foundations of Adult Education	3.0

EDHE 634	Proposal Writing & Sponsored Project Management	3.0
EDHE 640	Foundations of Institutional Research	3.0
EDHE 646	Survey Tools, Statistical Software & Effective Reporting	3.0
EDHE 664	Strategies for Educational Success	3.0
Total Credits		**15.0**

** For students entering the program with a strong background in Higher Education who are looking for an extension of their previous studies.

Educational Administration (Pennsylvania Superintendent Certification) †

EDEX 712	Instructional & Curriculum Leadership in Special Education	3.0
EDUC 817	Curriculum Models	3.0
EDUC 820	School Superintendency	3.0
EDUC 824	Parents and Schools	3.0
EDUC 827	School Superintendent's Internship: Curriculum Models	1.0
EDUC 828	School Superintendent's Internship: Parents and Schools	1.0
EDUC 829	School Superintendent's Internship III	1.0
EDUC 830	School Superintendent's Internship IV	1.0
Total Credits		**16.0**

† For students with the background and interest in seeking PA School Superintendent Certification

Athletic Administration Concentration

SMT 601	Sports Industry Management	3.0
SMT 602	Sport Law & Risk Management	3.0
SMT 606	Contemporary Issues in Sport	3.0
SMT 612	Development & Fundraising Strategies in Sport	3.0
SMT 635	Sport Facilities & Event Management	3.0
Total Credits		**15.0**

Human Resource Development Concentration

EHRD 500	Foundations of Human Resources Development ††	3.0
EHRD 601	Leading and Evaluating Change	3.0
EHRD 602	Coaching and Mentoring for Sustainable Learning	3.0
EHRD 604	Development of Human Resources	3.0
EHRD 606	Human and Organizational Performance	3.0
Total Credits		**15.0**

†† A 3.0 credit substitute course will be identified to replace EHRD 500 for students who have already earned a master's degree in Human Resource Development.

Educational Policy Concentration

EDPO 620	Education Policy: Concepts, Issues, and Applications	3.0
EDPO 624	Shaping of American Education Policy: Global Forces	3.0
EDPO 628	American Educational Policy and U.S. Competitiveness	3.0

EDPO 632	Ethics in Educational Policy Making	3.0
EDPO 636	Access & Equity in Educational Policy Making	3.0
Total Credits		**15.0**

Global and International Education Concentration

EDGI 500	Introduction to Global, International & Comparative Education	3.0
EDGI 504	History and Theory of Comparative Education	3.0
EDGI 510	Culture, Society & Education in Comparative Perspective	3.0
EDGI 512	Globalization and Educational Change	3.0
EDGI 514	Education and National Development	3.0
Total Credits		**15.0**

Learning Technologies Concentration

EDLT 532	Designing Virtual Communities for Staff Development - Non-Field Experience	3.0
EDLT 537	Technologies for Performance Support	3.0
EDLT 543	Play & Learning in a Participatory Culture	3.0
EDLT 550	Introduction to Instructional Design	3.0
ELL 501	The Purpose and Business of E-Learning	3.0
Total Credits		**15.0**

Creativity & Innovation Concentration

CRTV 501	Foundations in Creativity	3.0
CRTV 502	Tools and Techniques in Creativity	3.0
CRTV 503	Creativity in the Workplace	3.0
CRTV 620	Research Methods and Assessment of Creative and Innovative Thinking	3.0
CRTV 630	Global Perspectives on Creativity	3.0
Total Credits		**15.0**

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD.* Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD *(Arizona State University).* Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

José Luis Chávez, EdD *(University of Southern California.) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento.* Clinical Professor. Higher education leadership and administration.

Ellen Clay, PhD *(University of Southwestern Louisiana).* Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.

Rebecca Clothey, PhD *(University of Pittsburgh) Director, Higher Education Program.* Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Marion Dugan, EdD *(University of Pennsylvania).* Auxiliary Associate Professor. Language arts, student teaching.

Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD *(North Carolina State University) Director of the Human Resource Development (HRD) program at Drexel University.*. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD *(Michigan State University)*. Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities.

Kathy Geller, PhD *(Fielding Graduate University)*. Assistant Clinical Professor. Educational leadership and management.

Rajashi Ghosh, PhD *(University of Louisville, Kentucky)*. Assistant Professor. Mentoring and leader development, workplace Incivility, workplace learning and development.

John M. Gould, PhD *(University of Pittsburgh) Harrisburg EdD Educational Leadership & Change Program*. Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD *(Case Western Reserve University)*. Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD *(Indiana University)*. Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD *(Harvard University)*. Associate Professor. Enhanced learning, socio-cultural learning, distance education.

Elizabeth Haslam, PhD *(University of Pennsylvania)*. Auxiliary Associate Professor. Educational field coordinator, instructional design, qualitative evaluation, writing across the curriculum.

Jennifer Katz-Buonincontro, MFA, PhD *(University of Oregon)*. Assistant Professor. Educational administration.

Kristine Lewis, PhD *(Temple University)*. Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD *(University of Maryland) Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD *(Curtin University, Science and Mathematics Education Centre, Perth, Australia)*. Assistant Professor.

Michel Miller, PhD *(University of Miami, Florida)*. Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD *(Saint Joseph's University) Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD *(Pennsylvania State University)*. Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD *(Vanderbilt University.) Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD *(University of Virginia)*. Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD *(Temple University) Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD *(Temple University)*. Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD *(University of Pennsylvania) Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD *(Syracuse University) Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Graduate Intern Teaching Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 33.0 (secondary); 42.0 (Pre-K)
Instructional Delivery: Campus, Online
Calendar Type: Quarter
Expected Time to Completion: 1 - 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1202; 13.1205
Standard Occupational Classification (SOC) Code: 25-2021; 25-2022; 25-2031

Admission Requirements
Applicants for the Graduate Intern Teaching Certificate program must complete an interview with a teacher education advisor before completing a graduate application. During this interview the applicant's transcripts are evaluated in relation to Pennsylvania state standards for the specific certification area. If coursework is dated, a content exam or additional coursework may be required. Life experience that demonstrates knowledge of the content area will be considered. Additional coursework in the content area may be required to meet certification standards. In

addition, applicants must meet the general admission requirements for graduate studies at Drexel University.

Program Requirements

Graduate Intern Teaching Certificate applicants for secondary certification must have a bachelor's degree in an area related to that in which they intend to become certified. Minimum coursework requirements include 33.0 credits (secondary) and 42.0 credits (PreK-4) of pedagogy, which may be incorporated into the graduate Teaching, Learning and Curriculum master's degree program in the subject area of certification.

Intern teachers may obtain a full-time teaching position after they have been recommended for the Pennsylvania Department of Education Intern Teaching Certificate. To be recommended, students must be admitted into the Drexel graduate program, obtain at least a B in EDUC 520 Professional Studies in Instruction, EDEX 542 Fundamentals of Special Education, the appropriate methods course, and EDUC 540 Field Experience, and obtain the necessary scores on the appropriate sections of the Praxis Series assessment through Educational Testing Service (ETS) for Secondary Certification or PECT exams through Pearson Education for PreK-4 Certification.

Completion of all required pedagogy coursework with at least a B in each and a B average in required content courses and passing the appropriate Pennsylvania state licensing exams will satisfy requirements for Pennsylvania Instructional I Certification.

Instructional Technology Specialist Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 34.5
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.0501
Standard Occupational Classification (SOC) Code: 25-9031

The instructional technology specialist certificate program was designed to address the dramatically increasing need in public education for certified instructional technology specialists at every level of K-12 schooling.

Applicants for instructional technology specialist Certification should ideally possess valid Pennsylvania Instructional I or II Teaching Certification. Students working on their initial teaching certificate may begin working toward this these certificate with special permission of a teacher education advisor. (Visit the School of Education (http://www.drexel.edu/soe) for additional information.)

Minimum coursework requirements for the instructional technology specialist Certificate include 25.5-31.5 credits of specific pedagogy. The PA Certification requires a "B" or better in all certification coursework. If a student seeks the Instructional Technology Specialist PA Certification without a previous held teaching certificate, he or she will need to complete EDUC 522 (p. 363) and EDUC 525 (p. 363).

Core Courses

EDLT 533	Designing Virtual Communities	3.0

EDLT 534	Developing Educational Leaders Using Technology	3.0
EDLT 535	Researching & Evaluating Instructional Technology	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 552	Integrating Technology for Learning & Achievement	4.5
INFO 520	Social Context of Information Professions	3.0
INFO 640	Managing Information Organizations	3.0
Additional required courses for candidates without prior teacher certification:		0.0-6.0
EDUC 522	Evaluation of Instruction	
EDUC 525	Multi-Media Instructional Design	
Total Credits		**28.5-34.5**

Applied Behavior Analysis

Major: Applied Behavior Analysis
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 42.2814
Standard Occupational Classification (SOC) code: 19-3031

Behavior analysis is a widely accepted and validated scientific approach to the description and investigation of the environmental arrangements that occasion behavior. More than 60 years of research with proven methods and impressive findings has helped develop the technology now called applied behavior analysis. Over the past five decades, behavior analytic clinical and research advances have led to significant contributions in education programming, and mental health and behavioral health therapies.

The Master of Science in Applied Behavior Analysis will prepare clinical and educational leaders in the field of evidence-based interventions using behavior analytic theory and techniques. Leaders from this program will be highly successful candidates for institutions searching for knowledgeable and skilled behavior analytic consultants, program coordinators, senior clinical directors and interventionists. These students will also be prepared to transition to PhD programs in Applied Behavior Analysis, School and Clinical Psychology, and Experimental Psychology.

The Behavior Analyst Certification Board, Inc.® has approved the Master's Core Applied Behavior Analysis course sequence as meeting the coursework requirements for eligibility to take the Board Certified Behavior Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Additional Information

For more information about this program, contact:

Dr. Christina Vorndran
Associate Clinical Professor
Applied Behavior Analysis Program
cmv69@drexel.edu

Admission Requirements

Applicants for the program will follow the university standards for admission to graduate study. Prospective students must have earned a bachelor's degree from an accredited institution and have an undergraduate GPA of 3.0 or higher to be considered for admission (graduate degree GPAs will be considered along with the undergraduate GPA).

In addition, prospective students are required to submit the following:

- Completed Application Form including official transcripts from all universities or colleges attended
- Two letters of recommendation
- Personal essay
- Resume
- Application fee

The admissions committee will evaluate the applicant's potential and commitment to succeed in graduate study. The applicant's potential to contribute to the overall quality of the program of study will also be considered.

Interviews, in person or by phone, will be conducted by the admissions committee with those applicants who meet Graduate Admission's standard admissions criteria.

Decisions will be made using dates corresponding to the regular university schedule for rolling admissions in Graduate Admissions.

Additional Information

For more information about this program, contact:

Dr. Christina Vorndran
Associate Clinical Professor
Applied Behavior Analysis Program
cmv69@drexel.edu

Degree Requirements

Requirements

Core Applied Behavior Analysis Courses		
EDEX 630	Fundamental Elements of Behavior Change	4.5
EDEX 631	Measurement and Experimental Design	4.5
EDEX 632	Behavioral Assessment and Functional Analysis	4.5
EDEX 633	Behavioral Interventions	4.5
EDEX 634	Consultation, Systems Change and Supervision	4.5
EDEX 635	Ethical Considerations and Professional Conduct	4.5
Select one option from the following:		12.0
Option 1: Autism Spectrum Disorders Concentration		
EDEX 556	Characteristics & Methods: Autism	
EDEX 558	Characteristics & Methods: High Functioning Autism	
EDEX 560	Communication & Language Interventions: Autism Spectrum Disorders	
EDEX 562	Behavior & Sensory Support: Autism Spectrum Disorders	
Option 2: Professional Electives		
EDEX 700	Practicum in Applied Behavior Analysis	
EDEX 700	Practicum in Applied Behavior Analysis	
EDEX 700	Practicum in Applied Behavior Analysis	
EDEX 700	Practicum in Applied Behavior Analysis	
EDEX 700	Practicum in Applied Behavior Analysis	
ABA elective (EDEX course, 3.0 credits, dealing with Autism selected in consultation with Program Manager or Advisor)		
Capstone Courses		
EDEX 610	Action Research for Special Education Teachers I	4.5
EDEX 611	Action Research for Special Education Teachers II	1.5
Total Credits		**45.0**

The Behavior Analyst Certification Board, Inc.® has approved the Core Applied Behavior Analysis course sequence as meeting the coursework requirements for eligibility to take the Board Certified Behavior Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD.* Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD *(Arizona State University).* Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

José Luis Chávez, EdD *(University of Southern California.) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento.* Clinical Professor. Higher education leadership and administration.

Ellen Clay, PhD *(University of Southwestern Louisiana).* Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.

Rebecca Clothey, PhD *(University of Pittsburgh) Director, Higher Education Program.* Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Marion Dugan, EdD *(University of Pennsylvania).* Auxiliary Associate Professor. Language arts, student teaching.

Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD *(North Carolina State University) Director of the Human Resource Development (HRD) program at Drexel University.*. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD *(Michigan State University).* Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities.

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Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Creativity and Innovation

Major: Creativity and Innovation
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13-9999
Standard Occupational Classification (SOC) code: 11-9199

About the Program

In a world of increasing complexity, change, and competition, generating new ideas and bringing them to the table is now essential for corporate management. Creativity is multidisciplinary – it is in all professional fields from chemistry to engineering, from education to computer science, and from sociology to business. Successful organizations, in all fields, view creativity as vital and are the ones that instill creativity throughout the organization. The application of creativity skills distinguishes managers who maintain the status quo from leaders who inspire a new direction or vision. By internalizing the spirit of creativity and the principles of creative problem solving, individuals can be transformed into change leaders.

Upon successful completion of this master's degree program, students will be able to recognize problematic situations within various settings. They will also enable their organization to foster creative environments and identify creative problem-solvers within their workforce.

For more information, visit Drexel University Online's MS in Creativity and Innovation (http://www.drexel.com/online-degrees/business-degrees/ms-creativity-innovation) website.

Degree Requirements

Required Core Courses

CRTV 501	Foundations in Creativity	3.0
CRTV 502	Tools and Techniques in Creativity	3.0
CRTV 503	Creativity in the Workplace	3.0

CRTV 610	Creativity and Change Leadership	3.0
CRTV 620	Research Methods and Assessment of Creative and Innovative Thinking	3.0
CRTV 630	Global Perspectives on Creativity	3.0
CRTV 640	Creativity & Innovation: 1500-Present	3.0
CRTV 650	Current Trends in Creativity & Innovation	3.0
CRTV 660	Diagnostic Creative Intervention	3.0
Total Core Credits		27.0
Professional Electives		18.0

Electives will be selected in consultation with the Program Director and/or Advisor.

Total Credits		45.0

Suggested Electives

Consider three courses from the following options:

EDAM 500	Leading in Urban, Rural and Suburban Settings
EDPO 620	Education Policy: Concepts, Issues, and Applications
EDPO 628	American Educational Policy and U.S. Competitiveness
EDPO 632	Ethics in Educational Policy Making
EDHE 680	Foundations of Evaluation
EDHE 682	The Evaluation Process
EDLT 537	Technologies for Performance Support
EDLT 538	New Media Literacies
EDUC 516	Diversity and Today's Teacher
EDUC 532	Designing Virtual Communities for Staff Development - Non-Field Experience
EDUC 561	Mediating and Resolving Conflict in School Settings
EDUC 702	School Leadership & Decision Making
EDUC 800	Educational Leadership & Change
EDUC 804	Program Evaluation in Organizations

Education Improvement and Transformation

Major: Education Improvement and Transformation
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13-9999
Standard Occupational Classification (SOC) code: 11-9032; 11-9033; 11-9099

About the Program

One of the great challenges of our time is the improvement of the American education system from pre-school through retirement. Once the envy of the world, there are cracks in the education crucible which must be repaired or reforged. The system has endured social, intellectual, and economic challenges beyond its capacity to respond in a way that provides a sound foundation for all Americans, while keeping our country safe and competitive for the future.

The MS in Education Improvement and Transformation program is designed to prepare professional educators—as well as other professionals whose career interests lie in leading significant change in education—in the process of initiating transformative (reform) in formal and informal education sectors.

The program is comprised of "Professional Development Concentrations" (PDC), each focusing on specific topics pertaining to the improvement and transformation of education. Each PDC is comprised of nine credits (or 3 courses) of focused course work in a specific area, i.e.:

- Collaborative Special Education Law and Process
- Creativity and Innovation
- E-Learning Leadership
- Educational Policy
- Evaluation and Assessment
- Instructional Design
- Leadership in Educational Settings
- Learning in Game-based Environments
- Learning Technologies
- Special Education Leadership
- Urban Education

Students may opt to create their own PDC with advisement of the Program Manger for the MS in Education Improvement and Transformation program.

After students complete four PDC's totaling a minimum of 36.0 credits, they will finish the program by enrolling in two sequential courses (9.0 additional credits) that jointly form a capstone project to provide a real-life, hands-on experience in being an agent for change in transformative education. The combination of the 4 PDC's and the two capstone project courses provides the student with the 45.0 credits required for the MS degree.

Additional Information

For additional information, visit Drexel University's Master of Science Program's in Education (http://www.drexel.edu/soe/academics/graduate) page.

Degree Requirements

The Master of Science in Education Transformation program is comprised of 14 courses. The core of the program is made up of four "Professional Development Concentrations" in strategic education improvement areas and topics.

These concentrations are listed under the Certificate Programs in Education and Transformation (https://nextcatalog.drexel.edu/graduate/schoolofeducation/educationimprovementcert), and include areas such as assessment, strategic partnership, change leadership, educational policy, disabilities, virtual schools, charter schooling, home schooling, community engagement & development, urban education, school boards, and financing education. Additional concentrations may be developed on a topical needs or special population-based basis.

The final two courses of the program consist of a 4.5 credit Evaluation & Assessment courses and a 4.5 credit Capstone Project. The Capstone Project is an individualized course.

Degree Requirements

Students complete four areas of professional development concentration. These 9.0 credit concentrations correspond to certificates offered in the Education and Improvement and Transformation program. View those certificate programs for a list of courses.		36.0
Project/Capstone Requirements		
EIT 715	EIT Evaluation, Assessment and Capstone Preparation	4.5
EDUC 799	Course EDUC 799 Not Found (EIT Capstone Project)	4.5
Total Credits		**45.0**

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Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development

strategies, used to help educators make visible improvements in programmatic learning outcomes.

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Patricia Henry Russell, MS *(Drexel University).* Teaching Professor. Probability and statistics.

Educational Administration

Major: Educational Administration
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13.0401
Standard Occupational Classification (SOC) code: 11-9032

About the Program

The MS in Educational Administration program is designed to prepare and mentor future leaders using state and national leadership standards with the practical skills, knowledge, and internship experiences to become effective leaders in rural, urban, and suburban schools. The vision of the program is to create a collaborative and mentoring community of school leaders who contribute to a "research of practice" that significantly improves learning for all students.

Using state and national leadership standards, this master's degree is designed to prepare and mentor future elementary and secondary educational leaders with the practical skills, knowledge and internship experiences to become effective leaders in rural, city and suburban schools. This program is ideal for prospective students holding a teaching

or counseling certificate who wish to advance into school administration with principal certification.

The program is designed as a part-time cohort model, and can be completed in two years. View the degree requirements (p. 369) for more detailed information about the courses.

Program Objectives

Graduates of the MS in Educational Administration program will be prepared to:

- Meet Pennsylvania certification standards
- Facilitate the development, articulation, implementation, and stewardship of a school/district vision of learning that is shared and supported by the school community
- Advocate, nurture, and sustain a school culture and instructional program conducive to student learning and staff professional growth
- Ensure management of the organization, operations,and resources for a safe, efficient, and effective learning environment
- Collaborate with families and community members, responding to diverse community interests and needs, and mobilizing community resources
- Act with integrity, fairness, and in an ethical manner
- Understand, respond to, and influence the larger political, social, economic, legal, and cultural context
- Monitor and evaluate students' achievements and programs on challenging standards for external and internal accountability goals
- Build teacher leadership capacity and mentor principal interns
- Conduct and share action research that documents sustainability in meeting school accountability goals and has practical, immediate, and useful application for other educators

For additional information, visit the School of Education's MS in Educational Administration (http://drexel.edu/soe/academics/graduate/educational-administration) web page or the Drexel University Online (http://www.drexel.com/online-degrees/education-degrees/ms-ed-admin) web site.

Admission Requirements

Acceptance for graduate study in Drexel University's School of Education requires:

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate degree GPAs will be considered along with the undergraduate GPA).
- Complete graduate school application (http://www.drexel.com/online-degrees/education-degrees/ms-ed-admin/apply.aspx).
- Official transcripts from *all universities or colleges and other post-secondary educational institutions (including trade schools)* attended. Instead of hard copy transcripts, you may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online (use our email address, customerservice@drexel.com). You must supply transcripts regardless of the number of credits earned or the type of school you attended. If you do not list all post-secondary institutions on your application and these are listed on transcripts received from other institutions, processing of your application will be delayed until you have submitted the remaining transcripts. Use the Transcript Lookup Tool (http://www.drexel.com/tools/transcript.aspx) to assist you in contacting your previous institutions. If a college or university that you

attended offers the option to send transcripts in a secure, password-protected electronic format, you may have the transcript sent to customerservice@drexel.com.

- Two letters of recommendation, either professional or academic.
  - Drexel University Online now accepts electronic letters of recommendation. Please access the following webpage for instructions regarding their submission: https://deptapp08.drexel.edu/em/LOR/. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
  - One letter of recommendation must come from the principal of the school where the applicant has worked. (Recommendation must include applicant's presentation skills and experiences in leadership roles help in a K-12 school setting as well as the skills observed that would have a strong bearing on the applicant's success as a school leader and administrator.)
- An essay describing why the applicant is interested in pursuing graduate study in this field.
  - Applicant must include two paragraphs briefly describing their educational philosophy and explaining how principals shape learning in K-12 schools.
- International Students (http://www.drexel.com/online-degrees/education-degrees/ms-ed-admin/international.aspx): must submit a TOEFL score of 550 or higher. Students with transcripts from non-US institutions should have such transcripts evaluated by World Education Service (WES). The TOEFL examination is required for some non-citizens.

Degree Requirements

Option 1: MS in Educational Administration (with principal certification)

EDUC 702	School Leadership & Decision Making	3.0
EDUC 705	School Law and Politics	3.0
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
EDUC 712	School and Community Partnerships and Relations	3.0
EDUC 714	Instructional and Curriculum Leadership	3.0
EDUC 715	School Principal Internship: Technology	1.5
EDUC 716	School Principal Internship: Finance	1.5
EDUC 717	School Principal Internship: Leadership	1.5
EDUC 718	School Principal Internship: School and Community Relations	1.5
Advanced Leadership Courses		
EDAM 500	Leading in Urban, Rural and Suburban Settings	3.0
EDAM 502	Resource Management, Allocation and Entrepreneurship	3.0
EDAM 522	Evaluation & Assessment Competencies	3.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
EDAM 526	Interpreting & Evaluating Research & Achievement Data	3.0
EDAM 528	Research Methodology for Action Research	3.0
EDAM 540	Action Research Project	3.0

Option 2: MS in Educational Administration (without principal certification)

EDUC 702	School Leadership & Decision Making	3.0
EDUC 705	School Law and Politics	3.0
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
EDUC 712	School and Community Partnerships and Relations	3.0
EDUC 714	Instructional and Curriculum Leadership	3.0
EDAM 500	Leading in Urban, Rural and Suburban Settings	3.0
EDAM 502	Resource Management, Allocation and Entrepreneurship	3.0
EDAM 522	Evaluation & Assessment Competencies	3.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
EDAM 526	Interpreting & Evaluating Research & Achievement Data	3.0
EDAM 528	Research Methodology for Action Research	3.0
EDAM 540	Action Research Project	3.0
6 credits of MS electives [*]		6.0
Total Credits		**45.0**

[*] An MS elective can be any graduate course at Drexel University, as long as the student has attained prior Program Manager/Director approval for taking the course.

Performances

The performances for meeting Pennsylvania leadership standards and National Leadership Standards include a Leadership Portfolio. The Leadership Portfolio includes:

- Four Log Reflections -- explaining growth in log reflection over each term
- Evidence of 600 hours across four terms logged in the Internship
- Logs over 48 weeks
- Four term Goal Statements and Reflections on accomplishments
- Two to three artifacts on each of the ELCC standards totaling 14 to 21 or more artifacts
- An explanation of how each artifact shows applications of skill on each identified standard
- Four evaluations on the ELCC Standards and Drexel Competencies completed by the school site supervising principal

In addition, students must have a passing score of 163 on the Pennsylvania PRAXIS, School Leaders Licensure Assessment (6011).

Special Education Leadership Concentration

The Special Education Leadership concentration within the MS in Educational Administration leads to the Supervisor of Special Education Certification. The concentration is designed to produce educators who are equipped with the advanced skills, knowledge and competencies they will need to collaboratively lead programs that meet the needs of students at risk and with disabilities in multiple settings. The 46.0 credit program fulfills the requirements for the Pennsylvania Department of Education approved certification and a master's degree in Educational Leadership.

Candidates are required to complete 300 internship hours for the Supervisor of Special Education Certification. Eligibility for PA Special Education Leadership certificate requires verification that the candidate has completed five years of satisfactory professional school experience

on a state-issued certificate appropriate for the assignment. All courses must be completed with a B or better.

Required Core Courses for the MS Program

EDAM 500	Leading in Urban, Rural and Suburban Settings	3.0
EDAM 502	Resource Management, Allocation and Entrepreneurship	3.0
EDAM 522	Evaluation & Assessment Competencies	3.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
EDAM 526	Interpreting & Evaluating Research & Achievement Data	3.0
EDAM 528	Research Methodology for Action Research	3.0
EDAM 540	Action Research Project	3.0
Core Certification Courses		
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
EDEX 710	School Law & Policy in Special Education	3.0
EDEX 712	Instructional & Curriculum Leadership in Special Education	3.0
EDEX 714	Development, Supervision, & Support: Special Education Leadership	3.0
EDEX 716	Organization & Administration of Special Education	3.0
EDEX 721	Supervisor of Special Education Internship: Special Education Leadership	1.0
EDEX 722	Supervisor of Special Education Internship: Instructional Leadership	1.0
EDEX 723	Supervisor of Special Education Internship: Collaboration & Personnel	1.0
EDEX 724	Supervisor of Special Education Internship: Finance & Management	1.0
MS elective [*]		3.0
Total Credits		**46.0**

[*] An MS elective can be any graduate course at Drexel University, as long as the student has attained prior Program Manager/Director approval for taking the course.

Special Education Leadership & Principal Leadership Concentration

The Special Education Leadership & Principal Leadership concentration within the MS in Educational Administration leads to the Supervisor of Special Education Certification and Principal Certification. The concentration is designed to prepare future leaders with the tools and knowledge to collaboratively address special education programs and issues within a school setting. The 49.0 credit dual certification program fulfills the requirements for both Pennsylvania Department of Education approved certifications and a master's degree.

Candidates are required to complete 300 internship hours for the Supervisor of Education Certification and 400 internship hours for Principal Certification.

Eligibility for PA Special Education Leadership certificate requires verification that the candidate has completed five years of satisfactory professional school experience on a state-issued certificate appropriate for the assignment.

Eligibility for the PA Principal certificate requires verification that the candidate has completed three years of satisfactory professional school experience on a state-issued certificate appropriate for the assignment and appropriate Praxis exam. All courses must be completed with a B or better.

Required Core Courses for the MS Program

EDAM 522	Evaluation & Assessment Competencies	3.0
EDAM 528	Research Methodology for Action Research	3.0
EDAM 540	Action Research Project	3.0
Core Certification Courses		
EDUC 702	School Leadership & Decision Making	3.0
EDUC 705	School Law and Politics	3.0
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
EDUC 712	School and Community Partnerships and Relations	3.0
EDUC 714	Instructional and Curriculum Leadership	3.0
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EDUC 717	School Principal Internship: Leadership	1.5
EDUC 718	School Principal Internship: School and Community Relations	1.5
EDEX 710	School Law & Policy in Special Education	3.0
EDEX 712	Instructional & Curriculum Leadership in Special Education	3.0
EDEX 714	Development, Supervision, & Support: Special Education Leadership	3.0
EDEX 716	Organization & Administration of Special Education	3.0
EDEX 721	Supervisor of Special Education Internship: Special Education Leadership	1.0
EDEX 722	Supervisor of Special Education Internship: Instructional Leadership	1.0
EDEX 723	Supervisor of Special Education Internship: Collaboration & Personnel	1.0
EDEX 724	Supervisor of Special Education Internship: Finance & Management	1.0
Total Credits		**49.0**

Education Faculty

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Educational Administration

Special Education Leadership Concentration

The Special Education Leadership concentration within the MS in Educational Administration leads to the Supervisor of Special Education Certification. The concentration is designed to produce educators who are equipped with the advanced skills, knowledge and competencies they will need to collaboratively lead programs that meet the needs of students at risk and with disabilities in multiple settings. The 46.0 credit program fulfills the requirements for the Pennsylvania Department of Education approved certification and a master's degree in Educational Leadership.

Candidates are required to complete 300 internship hours for the Supervisor of Special Education Certification. Eligibility for PA Special

Education Leadership certificate requires verification that the candidate has completed five years of satisfactory professional school experience on a state-issued certificate appropriate for the assignment. All courses must be completed with a B or better.

Admission Requirements

- Bachelor's degree from a regionally accredited institution
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA)
- Completed Application
- Official Transcripts (from all colleges attended)
- Essay discussing your professional goals and interests in the program
- Two Recommendation Letters – Academic or Professional
- Proof of state-issued special education teacher certificate required

Degree Requirements

Required Core Courses for the MS Program

EDAM 500	Leading in Urban, Rural and Suburban Settings	3.0
EDAM 502	Resource Management, Allocation and Entrepreneurship	3.0
EDAM 522	Evaluation & Assessment Competencies	3.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
EDAM 526	Interpreting & Evaluating Research & Achievement Data	3.0
EDAM 528	Research Methodology for Action Research	3.0
EDAM 540	Action Research Project	3.0
Core Certification Courses		
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
EDEX 710	School Law & Policy in Special Education	3.0
EDEX 712	Instructional & Curriculum Leadership in Special Education	3.0
EDEX 714	Development, Supervision, & Support: Special Education Leadership	3.0
EDEX 716	Organization & Administration of Special Education	3.0
EDEX 721	Supervisor of Special Education Internship: Special Education Leadership	1.0
EDEX 722	Supervisor of Special Education Internship: Instructional Leadership	1.0
EDEX 723	Supervisor of Special Education Internship: Collaboration & Personnel	1.0
EDEX 724	Supervisor of Special Education Internship: Finance & Management	1.0
MS elective *		3.0
Total Credits		**46.0**

*   An MS elective can be any graduate course at Drexel University, as long as the student has attained prior Program Manager/Director approval for taking the course.

Global and International Education

Major: Global and International Education

Degree Awarded: Master of Science
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13.1319
Standard Occupational Classification (SOC) code: 25-2062

About the Program

The MS in Global and International Education is designed to prepare students with the skills and knowledge necessary to work effectively within the complex economic, political, cultural, and social contexts that influence education and learning in diverse parts of the world. In addition to being aware of the global trends and issues of diverse approaches to education, students will develop the attitudes necessary to support learners and learning within and beyond mainstream educational systems.

The program prepares students to work effectively with the complex global challenges, trends, and issues influencing education and learning in diverse parts of the world, including the United States.

Today, leaders are needed who are trained with the skills and practical knowledge required to work effectively within the context of global economic, political, cultural, and community influences on education, are aware of global trends and issues in the field of education, recognize the various dimensions of educational interventions and are able to analyze the implications for learners within and beyond mainstreams, and can critique the roles and approaches of international, comparative, and educational research. The program provides these necessary tools, experiences, understandings, and related attitudes.

Program Objectives

The mission of the Master of Science in Global and International Education program is to prepare students with the skills, knowledge, and attitudes necessary to work effectively with the complex economic, political, cultural, and social contexts that influence education and learning in diverse parts of the world. In addition to being aware of global trends and issues of diverse approaches to education, students will develop the attitudes necessary to support learners and learning within and beyond mainstream educational systems.

Graduates of this program will be qualified to pursue careers in higher education, ESL programs, education abroad, law firms, international education associations, accreditation agencies, local community international outreach centers, US government, international development or human service agencies, non-governmental agencies, as well as act as administrators, managers, and researchers in national and international organizations, foundations, associations, and corporations.

Graduates of this program will lead their organizations in addressing the dramatic change in society and culture due to globalization and how these influence education.

The program is designed as a part-time cohort model, and can be completed in two years. View the degree requirements for more detailed information about the courses.

Additional Information

For more information about this program, contact the Program Manager/ Academic Advisor:

Samantha Mercanti-Anthony
School of Education

sm853@drexel.edu

For additional information, also visit the School of Education's MS in Global and International Education (http://drexel.edu/soe/academics/graduate/global-international-education) web page or the Drexel Online (http://www.drexel.com/online-degrees/education-degrees/ms-global) web site.

Admission Requirements

Admission to this program requires:

- **Bachelor's degree** from a regionally accredited institution
- An undergraduate **GPA of 3.0 or higher** (graduate degree GPAs will be considered along with the undergraduate GPA).
- **Graduates of foreign schools** must also have of 550 or higher in the Test of English as a Foreign Language (TOEFL).
- Completed **Application** Form.
- **Official transcripts** from *all universities or colleges and other post-secondary educational institutions (including trade schools)* attended. Instead of hard copy transcripts, applicants may supply official electronic transcripts issued by a post-secondary institution directly to Drexel University Online (send to: customerservice@drexel.com).

  Applicants must supply transcripts regardless of the number of credits earned or the type of school attended. If an applicant does not list all post-secondary institutions on the application and these are listed on transcripts received from other institutions, processing of the application will be delayed until all remaining transcripts have been submitted the remaining transcripts.

  Use our Transcript Lookup Tool (http://www.drexel.com/tools/transcript.aspx) to assist contact with previous institutions. If a college or university offers the option to send transcripts in a secure, password-protected electronic format, have the transcript sent to customerservice@drexel.com.
- **Two letters of recommendation** - professional or academic.
  - Drexel University Online now accepts electronic letters of recommendation. Please access the following webpage for instructions regarding their submission: http://www.drexel.edu/apply/recommend. If a recommender prefers to submit an original, hard copy letter of recommendation, please remind the recommender that it must be signed and submitted in a sealed envelope signed across the flap by the recommender.
- Personal **Essay**
- **Resume.**
- International Students (http://www.drexel.com/online-degrees/education-degrees/ms-global/international.aspx) must submit a TOEFL score of 550 or higher. Students with transcripts from non-US institutions should have such transcripts evaluated by World Education Service (WES). The TOEFL examination is required for some non-citizens. Applicants whose native language is English (who list themselves as born in or citizens of the following countries: American Samoa, Australia, Bahamas, Barbados, Belize, Bermuda, Botswana, British West Indies, Brunei Darussalam, Canada, England, Ghana, Guam, Ireland, Jamaica, Lesotho, Liberia, Malawi, Malta, Mauritius, New Zealand, Papua New Guinea, Puerto Rico, Scotland, Sierra Leone, South Africa, Swaziland, Tanzania, Trinidad/Tobago, Uganda, Virgin Islands, Wales, Zimbabwe) are exempt from the TOEFL. Applicants whose native language is not English are exempt from the TOEFL if the applicant completed 4 years of high school in the United States or completed English 101 and English 102 with a grade of C or better from a US domestic accredited institution. Applicants who received an undergraduate or graduate degree from an academic institution located in the US, UK or Canada are also exempt from the TOEFL.

Please refer to Drexel Online's Master of Science in Global & International Education Admissions (http://www.drexel.com/online-degrees/education-degrees/ms-global/admissions.aspx) page for additional information.

Degree Requirements

A Master of Science in Global and International Education is a part-time online program. Students complete six core courses, four primary concentration courses, three secondary concentration courses, an elective and a capstone course.

Core Courses

EDHE 680	Foundations of Evaluation	3.0
EDGI 500	Introduction to Global, International & Comparative Education	3.0
EDGI 504	History and Theory of Comparative Education	3.0
EDGI 510	Culture, Society & Education in Comparative Perspective	3.0
EDGI 512	Globalization and Educational Change	3.0
EDGI 520	Political Economy of Education Reform	3.0
Primary Concentration Courses		
EDGI 506	Comparative Higher Education Systems	3.0
EDGI 508	Understanding Research in International & Comparative Education	3.0
EDGI 514	Education and National Development	3.0
EDGI 518	Analysis of Policy Issues in Global & International Education	3.0
Capstone Requirement		
EDGI 715	Co-op with Portfolio	1.5
EDGI 716	GIE Co-op Experience with Seminar	4.5
Select one of the following Secondary Concentrations:		9.0
Secondary Peace Education Concentration [*]		
EDGI 530	Peace Education	
EDGI 532	International Organizations in International Education	
EDGI 534	Conflict Resolution in an International Context	
Secondary Higher Education Concentration		
Select 3 of the following Higher Education courses:		
EDHE 500	Foundations of Higher Education	
EDHE 510	Governance, Management & Administration in Higher Education	
EDHE 520	Student Development & Customer Service Management	
EDHE 530	Higher Education Law	
Secondary E-Learning Leadership Concentration		
Select 3 of the following E-Learning Leadership courses:		
ELL 501	The Purpose and Business of E-Learning	
ELL 502	E-Learning Technologies	
ELL 503	Teaching and Learning Issues in E-Learning	
ELL 504	Learning Technologies & Disabilities	
ELL 604	Design & Delivery of E-Learning I	

ELL 605	Design & Delivery of E-Learning II

Secondary Educational Policy Concentration [**]

Select 3 of the following Educational Policy courses	
EDPO 620	Education Policy: Concepts, Issues, and Applications
EDPO 624	Shaping of American Education Policy: Global Forces
EDPO 632	Ethics in Educational Policy Making
EDPO 636	Access & Equity in Educational Policy Making

Secondary Learning Technology Concentration

Select 3 of the following:	
EDLT 538	New Media Literacies
EDUC 535	Researching & Evaluating Instructional Technology
EDLT 537	Technologies for Performance Support
EDUC 532	Designing Virtual Communities for Staff Development - Non-Field Experience

Sample Electives

Students can select courses as addional electives from within the School of Education or a course (with School of Education approval) from another Drexel University program, such as international business administration, foreign languages, women's studies, or science/technology/society.	
EDGI 600	Study Abroad Experience
EDGI 610	International Ecotourism & Education
Total Credits	**45.0**

*   As an alternative secondary concentration, students may create a customized area of study from other Drexel University departments/programs such as International Business Administration, Women's Studies, or Science/Technology/Society.

** To complete the Drexel Educational Policy Certificate, students complete 2 additional 3-credit courses: EDPO 628 and EDPO 640.

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD.* Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD *(Arizona State University).* Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

José Luis Chávez, EdD *(University of Southern California.) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento.* Clinical Professor. Higher education leadership and administration.

Ellen Clay, PhD *(University of Southwestern Louisiana).* Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.

Rebecca Clothey, PhD *(University of Pittsburgh) Director, Higher Education Program.* Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Marion Dugan, EdD *(University of Pennsylvania).* Auxiliary Associate Professor. Language arts, student teaching.

Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD *(North Carolina State University) Director of the Human Resource Development (HRD) program at Drexel University.*. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD *(Michigan State University).* Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities.

Kathy Geller, PhD *(Fielding Graduate University).* Assistant Clinical Professor. Educational leadership and management.

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Kristine Lewis, PhD *(Temple University).* Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD *(University of Maryland) Dean, Goodwin College of Professional Studies.* Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD *(Curtin University, Science and Mathematics Education Centre, Perth, Australia).* Assistant Professor.

Michel Miller, PhD *(University of Miami, Florida).* Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD *(Saint Joseph's University) Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

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David A. Urias, PhD *(University of Virginia)*. Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD *(Temple University) Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD *(Temple University)*. Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD *(University of Pennsylvania) Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD *(Syracuse University) Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Higher Education

Major: Higher Education
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13.0406
Standard Occupational Classification (SOC) code: 11-9033

About the Program

The MS in Higher Education program is designed specifically to prepare highly skilled and knowledgeable practitioners for administrative and management careers in higher education in the United States and abroad. Graduates will be qualified to pursue careers as professionals in university and college offices as well as careers in national and international organizations, foundations, associations, and corporations.

Program Objectives
Students graduating with an MS in Higher Education will possess outstanding leadership, organizational, interpersonal and advocacy skills, including the ability to communicate effectively with internal and external groups. Students will be provided with in-depth knowledge regarding both public and private (non-profit and for-profit) institutions, as well as small and large institutions and multi-campus institutions.

About the Curriculum
The curriculum incorporates an interdisciplinary approach, with courses offered through the School of Education and The LeBow College of Business. The program integrates leading learning strategies and instructional technologies into the course delivery. Courses introduce students to best practices, current research, software applications and database management systems. Students demonstrate knowledge and skills through both individual and group projects.

This program is 45.0 credits and consists of 15 courses: 6 core courses, 4 primary concentration courses, 3 elective courses or secondary concentration courses, and 2 capstone courses (co-op with portfolio I and II).

Primary concentration areas include:

- administration and organizational management

Secondary areas of concentration include:

- academic development, technology and instruction
- community college administration and leadership
- enrollment management
- financial management in higher education
- institutional advancement
- institutional research and planning
- student development and affairs

The program is designed as a part-time cohort model, and can be completed in two years.

Additional Information

For additional information, visit Drexel University's Higher Education, Administration and Leadership (http://drexel.edu/soe/academics/graduate/higher-education) page.

Admission Requirements

Applicants for the program will follow the university standards for admission to graduate study. In addition, the admissions committee will evaluate the applicant's potential and commitment to succeed in graduate study in higher education and at least one of the two program delivery formats. The applicant's potential to contribute to the overall quality of the program of study will also be considered.

Prospective students are required to submit the following:

- Completed Application Form
- Transcripts (must be provided for every institution attended)
- Referrals (two letters are required)
- Personal Essay

Prospective students must apply through Drexel Online (http://www.drexel.com) using the online application (http://www.drexel.com/Fields_of_Study/education/MSHE/apply.asp). Additional information about how to apply is available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/edu/higher-education) website.

Degree Requirements

This Master of Science in Higher Education program consists of 14 courses: 6 core courses, 4 primary concentration courses, 3 elective courses or secondary concentration courses, and 1 capstone course (co-op with portfolio).

Core Courses

EDHE 500	Foundations of Higher Education	3.0
EDHE 510	Governance, Management & Administration in Higher Education	3.0
EDHE 520	Student Development & Customer Service Management	3.0
EDHE 530	Higher Education Law	3.0
EDHE 602	Managing Campus Operations	3.0
EDHE 714	Introduction to Research Methods	3.0
Capstone		
EDHE 715	Higher Education Co-op I with Portfolio	1.5
EDHE 716	Higher Education Co-op II	4.5
Primary Concentration		

Students complete the four required courses for the primary concentration:

EDHE 540	Outcomes, Assessments & Continuous Improvement	3.0
EDHE 601	Strategic Planning & Evaluation	3.0
EDHE 606	Higher Education Career Development	3.0
ORGB 631	Leading Effective Organizations	3.0
Electives or Secondary Concentration (See Below)		9.0

Students select either any three elective courses (from offerings within the School of Education) or three courses within the secondary concentrations offered. Courses within a student's primary concentration do not count as electives.

Total Credits		**45.0**

Electives or Secondary Concentration

Secondary Concentration in Adult Education

Select three of the following:

EDAE 601	Foundations of Adult Education	3.0
EDAE 602	Adult Learning and Development	3.0
EDAE 603	Program Planning: Assessment & Evaluation of Adult Education	3.0
EDAE 604	Instructional Design and Delivery Strategies	3.0
EDAE 605	Instructional Skills for Teaching Adults Online	3.0

Secondary Concentration in Global and International Education

Select three of the following:

EDGI 500	Introduction to Global, International & Comparative Education	3.0
EDGI 506	Comparative Higher Education Systems	3.0
EDGI 508	Understanding Research in International & Comparative Education	3.0
EDGI 510	Culture, Society & Education in Comparative Perspective	3.0
EDGI 512	Globalization and Educational Change	3.0

Secondary Concentration in Higher Education Educational Policy

Required		
EDPO 620	Education Policy: Concepts, Issues, and Applications	3.0

Select two of the following:

EDPO 624	Shaping of American Education Policy: Global Forces	3.0
EDPO 632	Ethics in Educational Policy Making [*]	3.0
EDPO 636	Access & Equity in Educational Policy Making	3.0
EDPO 640	Educational Policy-Making Tactics & Influence	3.0

Secondary Concentration in Community College Administration and Leadership

Select three of the following:

EDHE 634	Proposal Writing & Sponsored Project Management	3.0
EDHE 664	Strategies for Educational Success	3.0
EDHE 668	Transformational Leadership	3.0
EDHE 669	Diversity in Higher Education	3.0

Secondary Concentration in Institutional Development and University Relations

Select three of the following:

EDHE 610	Institutional Advancement	3.0
EDHE 614	Alumni Relations	3.0
EDHE 616	Institutional Communications, Marketing & Public Relations	3.0
AADM 650	Fund Development for the Arts	3.0

Secondary Concentration in Financial Management

Select three of the following:

BUSN 501	Measuring and Maximizing Financial Performance	3.0
EDHE 602	Managing Campus Operations	3.0
EDHE 624	Capital Financing, Business Development & Asset Management	3.0
EDHE 626	Public-Private Funding and Legal Issues	3.0

Secondary Concentration in Institutional Research

Select three of the following:

EDHE 640	Foundations of Institutional Research	3.0
EDHE 644	Student Assessments & Academic Program Evaluation	3.0
EDHE 646	Survey Tools, Statistical Software & Effective Reporting	3.0
EDHE 680	Foundations of Evaluation	3.0
EDUC 803	Educational Research Design I	3.0

Secondary Concentration in Enrollment Management

Select three of the following:

EDHE 650	Introduction to Enrollment Management	3.0
EDHE 652	Enrollment Marketing, Recruitment & Retention	3.0
EDHE 654	Financial Aid & Enrollment Management	3.0
EDHE 656	Enrollment Management Database Systems & Management	3.0

Secondary Concentration in Learning Technologies and Instructional Design

Select 3 of the following:

EDLT 536	Learning Sciences and Instructional Design	3.0
EDLT 537	Technologies for Performance Support	3.0
EDLT 550	Introduction to Instructional Design	3.0

ELL 502	E-Learning Technologies	3.0
ELL 504	Learning Technologies & Disabilities	3.0

Secondary Concentration in Student Development and Affairs

Select three of the following:

EDHE 652	Enrollment Marketing, Recruitment & Retention	3.0
EDHE 662	Critical Issues in Student Affairs	3.0
EDHE 663	Safety and Crisis Management	3.0
EDHE 664	Strategies for Educational Success	3.0
EDHE 669	Diversity in Higher Education	3.0

*   If students have completed EDPO 632 as part of the primary concentration, it may not be used for the secondary concentration. In this case, students must select another EDPO course from the list.

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD.* Clinical Associate Professor. Leadership, supervision, and capacity development.

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Rajashi Ghosh, PhD *(University of Louisville, Kentucky).* Assistant Professor. Mentoring and leader development, workplace Incivility, workplace learning and development.

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Kristine Lewis, PhD *(Temple University).* Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

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Michel Miller, PhD *(University of Miami, Florida).* Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD *(Saint Joseph's University) Program Director.* Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD *(Pennsylvania State University).* Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD *(Vanderbilt University.) Director of the Program in Mathematical Learning and Teaching.* Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

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Fredricka K. Reisman, PhD *(Syracuse University) Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Human Resource Development

Major: Human Resource Development
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 52.1005
Standard Occupational Classification (SOC) code: 13-1151

About the Program

The MS in Human Resource Development program, with its strong emphasis on learning theory, is designed to prepare students with the competencies for success in promoting individual and organizational learning world wide. The online curriculum is both practice-oriented and research-based. Drexel's program is unique in the inclusion of a substantial co-op/capstone experience.

Human resource development refers to the principles, methods, and techniques for assessing and responding to the learning and development needs of employees and their organizations. The Master of Science in Human Resource Development prepares students to have a positive direct and indirect influence on the future of human resource development in its many forms. The program is designed to prepare graduates for strategic roles in promoting employee and organizational learning in various national and multi-national organizations, as well as to promote the use and integration of technology to support organizational learning.

The MS degree in Human Resource Development incorporates an interdisciplinary curriculum. Students may choose an area of concentration in either strategic human resources, evaluation and return on investment, instructional systems design and e-learning, or project management. The program integrates leading learning strategies and instructional technologies into course delivery. Courses expose students to best practices, current research, software applications, and database management systems. Students demonstrate their knowledge and skill acquisition through individual and group projects.

For additional information, contact the School of Education (http://www.drexel.edu/soe) or view the master's degrees online on the Drexel Online (http://www.drexel.com) web site.

Admission Requirements

Applicants for the program will follow the university standards for admission to graduate study. Prospective students must have earned a bachelor's degree from an accredited institution and have an undergraduate GPA of 3.0 or higher to be considered for admission (graduate degree GPAs will be considered along with the undergraduate GPA). In addition, prospective students are required to submit the following:

- Completed Application Form, including official transcripts from all universities or colleges attended
- Two letters of recommendation
- Personal essay
- Resume
- Application fee

The admissions committee will evaluate the applicant's potential and commitment to succeed in graduate study in the online environment. The applicant's potential to contribute to the overall quality of the program of study will also be considered.

Interviews, in person or by phone, will be conducted by the admissions committee with those applicants who meet Graduate Admission's standard admissions criteria.

Decisions will be made using dates corresponding to the regular university schedule for rolling admissions in Graduate Admissions.

For additional information, contact the School of Education (http://www.drexel.edu/soe) or view the master's degrees online on the Drexel University Online (http://www.drexel.com) web site.

Find additional details about how to apply on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/edu/human-resource-development) website.

Degree Requirements

The program requires 45.0 credit hours, consisting of 30.0 hours of core coursework and a 6.0 credit capstone course that includes a co-op project and results in the submission of a professional portfolio. In addition, students complete one of the following 9.0 credit concentrations:

- Strategic human resources
- Evaluation and return on investment (ROI)
- Instructional systems design (ISD) and e-learning
- Project management

Core Requirements

EHRD 500	Foundations of Human Resources Development	3.0
EHRD 600	Organizational Consulting	3.0
EHRD 601	Leading and Evaluating Change	3.0
EHRD 602	Coaching and Mentoring for Sustainable Learning	3.0
EHRD 604	Development of Human Resources	3.0
EHRD 606	Human and Organizational Performance	3.0
EHRD 607	Global Human Resource Development	3.0
EHRD 609	Training and Development	3.0
EDHE 660	Principles of Adult Education	3.0
EDUC 804	Program Evaluation in Organizations	3.0
Capstone Requirements		

| EHRD 715 | Capstone Co-op with Portfolio I | 1.5 |
| EHRD 716 | Capstone Co-op with Portfolio II | 4.5 |

Concentration Options

Students must select one concentration and complete all 9.0 credits of the required courses.		9.0
	Strategic Human Resources Concentration Courses:	
EHRD 605	Organizational Learning & Strategy	
EHRD 610	Strategic Competencies for HRD Leaders	
ORGB 631	Leading Effective Organizations	
	Evaluation & Return on Investment (ROI) Concentration Courses:	
EDHE 682	The Evaluation Process	
EDHE 684	Evaluation and Assessment in Practice	
EHRD 608	Evaluating the Value & Impact of Human Resource Development Interventions	
	Instructional Design & E-Learning Concentration Courses:	
EDLT 550	Introduction to Instructional Design	
ELL 501	The Purpose and Business of E-Learning	
ELL 502	E-Learning Technologies	
	Project Management Concentration Courses:	
PROJ 501	Introduction to Project Management	
PROJ 502	Project Planning & Scheduling	
PROJ 603	Project Leadership & Teamwork	

| **Total Credits** | **45.0** |

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Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Learning Technologies

Major: Learning Technologies
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13.0501
Standard Occupational Classification (SOC) code: 25-9031

About the Program

Master of Science Options

- MS degree with Instructional Technology Specialist, Game based Learning, Instructional Design, or E-Learning Leadership concentration: 45.0 quarter credits
- MS degree with Instructional Technology Specialist PA Certification (with previous teacher certification): 45.0 quarter credits
- MS degree with Instructional Technology Specialist PA Certification (without previous teaching certification): 49.5 quarter credits

Scope of the Program

The School of Education offers an MS in Learning Technologies program to prepare graduate students to meet the challenges schools, educational and corporate organizations face related to technology learning needs. Students can select an instructional technologies specialist concentration, a certificate concentration that prepares for the PA Certification in Instructional Technologies Specialist, or the following concentrations:

- E-Learning Leadership (p. 380)
- Instructional Design (p. 380)
- Instructional Technology Specialist

- Learning in Game-based Environments

The MS in Science and Learning Technologies program provides multiple field experiences, extensive skill development in coaching and mentoring, and a yearlong internship for hands-on experiences in various settings. Each student will develop a unique plan of study in cooperation with a School of Education academic advisor. Students are expected to maintain a continuous registration and will be encouraged to take two courses per term until completion of their program of study.

Courses are offered in an online format. The program also features occasional on-campus events and an annual conference for presentation of program participant research papers and projects, as well as invited keynote speakers, workshops and poster sessions.

Additional Information

For additional information about this program, contact the Program Manager:

Samantha Mercanti-Anthony
Program Manager
School of Education
sm853@drexel.edu
215.895.6894

Admission Requirements

Each candidate to the MS in Science and Learning Technologies will submit the following application materials:

- Completed application form
- Appropriate application fee
- Transcripts (must be provided for every institution attended)
- Personal essay, providing commitment to program's unique features
- Professional resume

Admission to the MS in Learning Technologies program will follow the University standards for admission to graduate study including the receipt of a Bachelor's degree from an accredited college or university with an earned GPA of 3.0 on a 4.0 scale.

Undergraduates who meet the rigorous requirements for participation in an MS program also may be considered. Ideally, a successful candidate will possess a public school teaching certificate or, in the case of an undergraduate pursuing the BS /MS track, complete teacher certification requirement in conjunction with the MS degree. For additional information, contact the School of Education. (http://www.drexel.edu/soe)

Information about how to apply is available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/apply/overview) website.

Degree Requirements

Depending on their goals and interests, students completing the MS in Learning Technologies choose either the Instructional Technology Specialist concentration, the Instructional Technology Specialist PA Certification option, or the Learning in Game-Based Environments concentration.

Required Courses

Core Courses		
EDAM 528	Research Methodology for Action Research	3.0
EDLT 536	Learning Sciences and Instructional Design	3.0

EDLT 537	Technologies for Performance Support	3.0
EDLT 538	New Media Literacies	3.0
Internship/Co-op (2 terms)		
EDLT 539	EDLT Co-op Seminar Course I	1.5
EDLT 540	EDLT Co-op Seminar Course II	4.5
Additional Required Core Courses ONLY for those pursuing Instructional Technology Specialist Certification w/o prior teaher Certification		
EDUC 522	Evaluation of Instruction	0.0-3.0
EDUC 525	Multi-Media Instructional Design	0.0-3.0
Concentration Courses *		
Concentration areas are selected from the list of areas below.		18.0-28.5
Professional Electives **		9.0-1.5
Varies depending on selected Concentration		9.0-0
Total Credits		**54.0**

* Specific courses that comprise the Concentrations Courses are dependent on the concentration selected and range from 18.0 credits to 25.5 credits. See Concentration Options below.

** The amount of Professional Elective credits needed for the degree vary dependent on the Concentration area selected.
• 1.5 credits of Professional Electives are needed for a candidate who pursues the Instructional Technology Specialist Certification concentration, but who does not possess prior teacher certification.
• 6.0 credits of Professional Electives are required for a candidate who pursues the Instructional Technology Specialist Certification concentration and already holds prior teacher certification.
• 9.0 credits of Professional Electives are required for a candidate who pursues a concentration in: *Instructional Design, e-Learning Leadership* or *Learning in Game-based Environments* .

Concentration Options:
Instructional Technology Concentration

18.0 Credits

The Instructional Technology Specialist Concentration program is designed for students interested in specializing in the area of instructional technology while not choosing to pursue PA Specialist Certification.

Concentration Courses		
EDLT 511	Computer Skills for Teachers	3.0
or INFO 688	Instructional Role for the Information Specialist	
EDLT 532	Designing Virtual Communities for Staff Development - Non-Field Experience	3.0
EDLT 534	Developing Educational Leaders Using Technology	3.0
EDLT 535	Researching & Evaluating Instructional Technology	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 640	Managing Information Organizations	3.0
Total Credits		**18.0**

Instructional Technology Specialist Certificate Concentration

28.5 - 34.5 Credits

The Instructional Technology Specialist Certificate Concentration was designed to address the dramatically increasing need in public education

for certified Instructional Technology Specialists at every level of K-12 schooling.

Students pursuing the Instructional Technology Specialist PA Certification require a "B" or better in all certification coursework. Applicants for Instructional Technology Specialist Certification should ideally possess valid Pennsylvania Instructional I or II Teaching Certification. (Visit the School of Education (http://drexel.edu/soe) for additional information.) If a student seeks the Instructional Technology Specialist PA Certification without a previous held teaching certificate, he or she will need to complete EDUC 522 and EDUC 525 as reflected in the Core Course List, above.

Concentration Courses		
EDLT 533	Designing Virtual Communities	3.0
EDLT 534	Developing Educational Leaders Using Technology	3.0
EDLT 535	Researching & Evaluating Instructional Technology	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 552	Integrating Technology for Learning & Achievement	4.5
EDUC 565	Foundations in Instructing English Language Learners	3.0
INFO 520	Social Context of Information Professions	3.0
INFO 640	Managing Information Organizations	3.0
For students without prior teaching certification		
Two additional courses are required for candidates without prior teacher certification to complete the PA Instructional Technology Specialist Certification		
EDUC 522	Evaluation of Instruction	0.0-3.0
EDUC 525	Multi-Media Instructional Design	0.0-3.0
Total Credits		**28.5-34.5**

E-Learning Leadership Concentration

18.0 Credits

The E-Learning Leadership concentration provides an in-depth understanding of online and distance learning theories.

ELL 501	The Purpose and Business of E-Learning	3.0
ELL 502	E-Learning Technologies	3.0
ELL 503	Teaching and Learning Issues in E-Learning	3.0
ELL 504	Learning Technologies & Disabilities	3.0
ELL 604	Design & Delivery of E-Learning I	3.0
ELL 605	Design & Delivery of E-Learning II	3.0
Total Credits		**18.0**

Learning in Game-Based Environments Concentration

18.0 Credits

The Learning in Game-based Environments Concentration prepares graduates to effectively use educational games in and out of the classroom and training center, provides an overview of game development processes, enables participants to build basic games, and most importantly, examines how to assess and evaluate the learning experience as it relates to educational games.

EDLT 541	Foundations of Game-Based Learning	3.0
EDLT 542	Research in Motivation & Game-based Learning	3.0
EDLT 543	Play & Learning in a Participatory Culture	3.0
EDLT 544	Integrating Games & Pedagogical Content Knowledge	3.0
EDLT 545	Design & Development of Learning Games I	3.0
EDLT 535	Researching & Evaluating Instructional Technology	3.0
Total Credits		**18.0**

Instructional Design Concentration

18.0 Credits

This concentration is designed to prepare teachers, instructors, practitioners and others to use instructional design for K-20 education, adult education, and workplace training that addresses the needs of thee millennial learner and collaborative networked communities.

Required Courses

EDLT 550	Introduction to Instructional Design	3.0
EDLT 554	Learning with Social Media and Mobiles	3.0
ELL 502	E-Learning Technologies	3.0
EDLT 811	Designing and Developing Multimedia Applications For Learning	3.0
Select two electives from the following:		6.0
EDUC 525	Multi-Media Instructional Design	
EDLT 533	Designing Virtual Communities	
EDLT 541	Foundations of Game-Based Learning	
EDLT 543	Play & Learning in a Participatory Culture	
Total Credits		**18.0**

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Patricia Henry Russell, MS *(Drexel University).* Teaching Professor. Probability and statistics.

Mathematics Learning & Teaching

Major: Mathematics Learning and Teaching
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13-1311
Standard Occupational Classification (SOC) code: 25-2022; 25-2031

About the Program

The MS in Mathematics Learning and Teaching is designed for current middle and high school mathematics teachers as well as mathematically inclined elementary teachers. The program is intended to support teachers in teaching mathematics where students learn with understanding, including supporting students in reasoning through the variety of complex mathematical situations that they encounter in the school mathematics curriculum. The Mathematics Learning and Teaching program includes courses with explicit focus on the use of technology in teaching and unpacking, and re-conceptualizing the mathematics of middle and high school curricula. In particular, the program of study involves courses that model best practices in mathematics education, including collaborative problem solving, reflection on practice, and student-centered instruction.

The mathematics education core courses are divided into two sets of courses: introductory (500-level) and advanced (600-level) courses. The introductory courses emphasize content-based and informed pedagogy, representation and communication, connections between multiple representations and multiple solution methods. The advanced courses emphasize common student conceptions, misconceptions and difficulties, diagnosing student thinking, addressing particular students' needs effectively, scaling "individualized instruction," and collaborative instructional design and analysis.

Currently, all courses in this program are offered in an online format.

Building on the existing offerings of this program, a concentration in Math Leadership and Coaching is available and will enable current mathematics teachers and leaders to apply for State-Approved Endorsements in Mathematics Coaching.

For additional information about this program, contact the School of Education (http://www.drexel.edu/soe).

Admission Requirements

Each candidate will submit the following application materials:

- Completed application form
- Appropriate application fee
- Transcripts (must be provided for every institution attended)
- Personal essay, providing commitment to program's unique features
- Professional resume

Admission to the MS in Mathematics Learning & Teaching program will follow the University standards for admission to graduate study including the receipt of a Bachelor's degree from an accredited college or university with an earned GPA of 3.0 on a 4.0 scale.

The Mathematics Learning and Teaching (MLT) program is built around the importance of the integration of research and practice and the importance of connecting school teaching practices with university coursework. As a result, there will be a fieldwork component for some courses. These courses require university students to interact with school-aged students, document their activity (ideally with video-recordings), and bring the results of their work back to the university class for collective analysis and reflection. MS and certificate students who are not current classroom teachers will need to obtain the appropriate Child Abuse and Criminal Record clearances for their state to work with school-aged students in schools during the school day. Such program candidates are also advised to talk with area school sin advance of entering one of the MLT programs to obtain the process for arranging the fieldwork components of the MLT courses.

Additional requirements for the MS in Mathematics Learning and Teaching program include:

- Completion of at least two semesters (or three quarters) of university calculus and at least one university mathematics course beyond university calculus. This additional course must be offered by the mathematics department and cannot include courses on the fundamentals of mathematics, college algebra, or mathematics for elementary school teachers. Exceptions to this requirement will be considered on an individual basis by the program director or the program admissions committee.
- All students must provide evidence of a current teaching position or must secure a site for field placement and complete the Child Abuse

and Criminal Record Clearance by the end of the winter term in the first year in the program.

For additional information, contact the School of Education (http://www.drexel.edu/soe). Additional information about how to apply is available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/edu/mathematics-learning-and-teaching) website.

Degree Requirements

Education Core Courses

EDUC 522	Evaluation of Instruction	3.0
EDUC 524	Current Research in Curriculum & Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
Mathematics Education Core Courses		
MTED 501	Proportional and Algebraic Reasoning	3.0
MTED 502	Geometry & Spatial Reasoning	3.0
MTED 503	Data Analysis and Probabalistic & Statistical Reasoning	3.0
MTED 511	Functions through the Curriculum	3.0
MTED 601	Diagnosing Student Mathematical Thinking	3.0
MTED 611	Virtual Field Experience I - Online Mentoring	1.5
MTED 612	Virtual Field Experience II - Online Mentoring	1.5
MTED 621	Collaborative Instructional Design & Analysis I	3.0
MTED 622	Collaborative Instructional Design & Analysis II	3.0
MTED 651	Problem Solving Strategies	3.0
MTED 690	Current Research in Mathematics Learning & Teaching	3.0
Electives		6.0
Total Credits		**45.0**

Building on the existing offerings of the Mathematics Learning and Teaching Program, this concentration will enable current mathematics teachers and leaders to apply for State-Approved Endorsements in Mathematics Coaching. The program is designed to address the needs of math coaches and leaders for all levels of pre-K-12 education. However, the program's flexible design will allow for students to specialize in preK-12, pre-K-8 or 6-12 mathematics coaching and leadership through appropriate selection of Mathematics Education Core courses.

The tables below shows the courses required for this concentration as well as an example of how they fit into the MS Mathematics Learning & Teaching program.

Mathematics Coaching and Leadership Concentration Courses

MTED 642	Mathematics Coaching and Leadership	3.0
MTED 643	Practicum in Mathematics Coaching and Leadership	2.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
Total Credits		**8.0**

Term 1		**Credits**
EDUC 522	Evaluation of Instruction	3.0
MTED 503	Data Analysis and Probabalistic Statistical Reasoning	3.0
	Term Credits	**6.0**

Term 2		
MTED 502	Geometry Spatial Reasoning	3.0
MTED 601	Diagnosing Student Mathematical Thinking	3.0
	Term Credits	**6.0**
Term 3		
EDUC 524	Current Research in Curriculum Instruction	3.0
MTED 501	Proportional and Algebraic Reasoning	3.0
	Term Credits	**6.0**
Term 4		
MTED 511	Functions through the Curriculum	3.0
EDAM 524	Mentoring and Collaborative Leadership	3.0
	Term Credits	**6.0**
Term 5		
MTED 651	Problem Solving Strategies	3.0
MTED 690	Current Research in Mathematics Learning Teaching	3.0
	Term Credits	**6.0**
Term 6		
MTED 611	Virtual Field Experience I - Online Mentoring	1.5
MTED 621	Collaborative Instructional Design Analysis I	3.0
	Term Credits	**4.5**
Term 7		
MTED 612	Virtual Field Experience II - Online Mentoring	1.5
MTED 622	Collaborative Instructional Design Analysis II	3.0
	Term Credits	**4.5**
Term 8		
EDUC 525	Multi-Media Instructional Design	3.0
MTED 642	Mathematics Coaching and Leadership	3.0
MTED 643	Practicum in Mathematics Coaching and Leadership	2.0
	Term Credits	**8.0**

Total Credit: 47.0

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Special Education

Major: Special Education
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 49.5
Classification of Instructional Programs (CIP) code: 13.0402
Standard Occupational Classification (SOC) code: 11-9039; 25-2053; 2054;2059

About the Program

The Master of Science in Special Education program is intended for those interested in gaining greater skills and expertise in the area of Special Education and/or a teaching certificate in the area of special education. Candidates seeking PA special education certification must have an active PA Instructional I or II teaching certificate in the appropriate area.

The Master of Science in Special Education seeks to produce professionals who are equipped with the fundamental skills, knowledge, and competencies they will need to meet the needs of students at risk for and with disabilities in multiple settings. The program is a flexible, part-

time graduate program consisting of 49.5 credits: 31.5 credits in Core Special Education Certification courses, 12.0 credits in concentration courses, and 6.0 credits in research. The program culminates with each potential graduate completing an action research project and presentation within his or her area of concentration.

Available Concentrations

*Autism Spectrum Disorder*s
Within the past decade, the number of children diagnosed with Autism or Asperger's Syndrome has increased drastically. Consequently, the need for professionals trained in this specialized area has significantly increased. This concentration is designed for those who seek additional expertise in this critical need area. It will provide knowledge and skills for working with both students with Autism and Asperger's Syndrome as well as effective teaching methods, interventions, and supports. Students who have an active PA Instructional I or Instructional II teaching certificate are eligible to apply for the PA Autism Spectrum Disorders endorsement upon completion of EDEX 551 and the concentration courses.

Collaborative Special Education Law and Process
Meeting the needs of children with disabilities through school-family-community collaboration is an ambitious goal of educational policy in the United States. An implementing objective is to develop highly qualified special education teachers and administrators in schools and the community, as well as to offer special education collaborative knowledge and practical skills training to parents and advocates, whose cooperative partnership is imperative to support the provisions for the successful learning of all students as incorporated and mandated in legislation such as No Child Left Behind (NCLB) and the Individuals with Disabilities Education Improvement Act of 2004 (IDEA).

Multisensory Reading Instruction Level I
It is estimated that up to 20% of school age children experience difficulty with some aspect of literacy. This course sequence gives teachers the necessary skills to provide direct instruction in a multisensory phonetic-based program to students with decoding deficits.With successful completion of the coursework, students are eligible for WILSON® Level 1 Certification.The Wilson Reading System® is recognized nationwide and is a highly desirable certification to have in Special Education.

Technologies for Special Education
Best practices in the education of students with disabilities requires educational professionals to be proficient with a wide range of technologies. This concentration is designed for those seeking additional expertise in the area of educational technologies and assistive technology that can be used to create accessible learning opportunities and increased outcomes for students with disabilities.

Customized Concentration
Students who already posses a special education certification or who are not interested in obtaining a special education certification but want to enhance their skills in specific special education topic areas may choose to take two of the concentrations (24.0 credits) and 19.5 credits of their choosing from the special education certification core in addition to completing the research courses.

Additional Information

For more information about this program, contact the program manager:

Owen Schugsta
School of Education
Drexel University
215.895.1690

ocs23@drexel.edu

Admission Requirements

Applicants for the program will follow the university standards for admission to graduate study. Prospective students must have earned a bachelor's degree from an accredited institution and have an undergraduate GPA of 3.0 or higher to be considered for admission (graduate degree GPAs will be considered along with the undergraduate GPA). In addition, prospective students are required to submit the following:

- Completed Application Form including official transcripts from all universities or colleges attended
- Two letters of recommendation
- Personal essay
- Application fee

The admissions committee will evaluate the applicant's potential and commitment to succeed in graduate study in the online environment. The applicant's potential to contribute to the overall quality of the program of study will also be considered.
Interviews, in person or by phone, will be conducted by the admissions committee with those applicants who meet Graduate Admission's standard admissions criteria.
Decisions will be made using dates corresponding to the regular university schedule for rolling admissions in Graduate Admissions.

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Degree Requirements

The Master of Science in Special Education requires 49.5 credits consisting of 31.5 credits in core special education certification courses, 12.0 credits in concentration courses, and 6.0 credits in research. For a certification in special education, students must have completed 9 prerequisite credits in special education accommodations to apply for certification in Pennsylvania.

A field component is required in most courses.

Pre-Requisite Courses

Students must have the following courses in order to apply for a certification in special education. All students entering this master's program from an approved PA certification program after 2011 should have had these core courses in their initial certification program. If a student does not have these courses, they must complete them with a minimum grade of "B" in addition to the core certification offerings.

EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0

One of the following, depending on whether pursuing the PreK-8 or 7-12 certification concentration:

EDEX 546	Literacy and Content Skill Development PreK-8	3.0
or EDEX 566	Literacy and Content Skill Development 7-12	

Required Courses: MS in Special Education Program

EDEX 548	Emotional and Behavioral Support of Individuals with Disabilities	4.5
EDEX 549	Teaching Individuals with High Incident Disabilities	3.0
EDEX 550	Teaching Individuals with Low Incident Disabilities	3.0
EDEX 551	Teaching Students with Autism Spectrum Disorder	4.5
EDEX 552	Integrating Technology for Learning & Achievement	3.0
Students complete a sequence of two courses specific to either the PreK-8 or the 7-12 certification concentration from the following:		9.0
EDEX 547 & EDEX 553	Special Education Processes PreK-8 and Special Education Practicum PreK-8	
OR		
EDEX 567 & EDEX 563	Special Education Processes 7-12 and Special Education Practicum 7-12	

Capstone Courses

EDEX 610	Action Research for Special Education Teachers I	4.5
EDEX 611	Action Research for Special Education Teachers II	1.5

Concentration Courses

Students complete courses from one of the concentrations listed below.		12.0
Total Credits		**45.0**

Concentration Options

Students must complete one of the following 12.0 credit concentrations options:		12.0

Autism Spectrum Disorders Concentration

EDEX 556	Characteristics & Methods: Autism
EDEX 558	Characteristics & Methods: High Functioning Autism
EDEX 560	Communication & Language Interventions: Autism Spectrum Disorders
EDEX 562	Behavior & Sensory Support: Autism Spectrum Disorders

Technologies for Special Education

EDEX 570	Integrating Assistive Technology for Individuals with High Incident Disabilities
EDEX 572	Integrating Assistive Technology for Individuals with Low Incident Disabilities
EDLT 535	Researching & Evaluating Instructional Technology
ELL 504	Learning Technologies & Disabilities

Collaborative Special Education Law & Process

EDEX 710	School Law & Policy in Special Education
EDEX 600	Family, School and Community Engagement in Special Education
EDEX 601	Special Education Advocacy
EDEX 602	Special Education Dispute Resolution and Skills Training

Multisensory Reading Instruction Level I *

EDLS 620	Applied Methods in Multisensory Reading Instruction
EDLS 621	Multisensory Reading Instruction K/1
EDLS 622	Basic Word Study I
EDLS 623	Basic Word Study II
EDLS 624	Multisensory Practicum I
EDLS 625	Multisensory Practicum II
EDLS 626	Multisensory Practicum III
Total Credits	**12.0**

* The multisensory reading instruction courses fulfill certain requirements (but not all) for the Wilson Language Level I certification.

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD.* Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD *(Arizona State University).* Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

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Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Teaching, Learning and Curriculum

Major: Teaching, Learning, and Curriculum
Degree Awarded: Master of Science (MS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Classification of Instructional Programs (CIP) code: 13.1399
Standard Occupational Classification (SOC) code: 11-9039

About the Program

The MS in Teaching, Learning, and Curriculum program provides two options: (Track I) earning a master's degree while completing initial certification to become a classroom teacher; or (Track II) earning a master's degree to enhance an existing career as a classroom teacher. Students in Track II select an area of concentration from among a variety of options, providing an opportunity for intensive study in teaching, learning, and curriculum; educational leadership; international education; instructional technology; or higher education. Students may also customize their own concentration based on their interests and professional needs.

Track I: Initial Pennsylvania Teacher Certification

This track incorporates current research on teaching and provides in-depth preparation in pedagogy, curriculum development, teaching students with special needs, implications of learner and task characteristics for instructional design, scaffolding instruction for diverse learners, the latest techniques in evaluation of instruction, and use of interactive technology in instruction. The student is provided opportunities to synthesize theoretical and practical knowledge through field study.

Successful completion of the core pedagogy courses, subject area content courses and state licensure exams allows for recommendation for PA Instructional I certification.

Track II: Advanced Studies in Teaching, Learning and Curriculum

This track is designed to provide students with advanced teaching knowledge and skills well beyond that required for initial Pennsylvania certification. Graduates will be prepared to function in a variety of roles as instructors, instructional leaders or researchers in local, state, national and international organizations, foundations, associations, corporations

and private educational institutions. The program also provides a strong foundation for doctoral level studies.

Program Goals

Graduates of the MS in Teaching, Learning and Curriculum will:

- Possess advanced knowledge related to effective instruction in a variety of educational settings.
- Demonstrate skills in developing, analyzing, implementing, and evaluating existing and new instructional strategies and practices in a variety of educational institutions/organizations.
- Exhibit outstanding leadership, organizational, cross cultural, inter-personal and advocacy skills including the ability to communicate effectively with internal and external groups.
- Have in-depth knowledge of both public and private (non-profit and for-profit) institutions as well as small and large institutions.

Admission Requirements

Admission to the MS in Teaching, Learning and Curriculum will follow the University standards for admission to graduate study including receipt of a bachelor's degree from an accredited college or university with an earned GPA of 3.0 on a 4.0 scale. Undergraduates who meet the rigorous requirements for participation in a Bachelor's and Master Dual Degree Program may also be considered. Ideally, a successful candidate will possess a public school teaching certificate or, in the case of an undergraduate pursuing the BS/MS track, complete teacher certification requirement in conjunction with the MS degree.

Prospective students can learn about specific admission requirements by visiting the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/edu/teaching-learning-and-curriculum) website.

Degree Requirements

Track I: Initial Pennsylvania Teacher Certification

A minimum of 45.0 credits is required for students with or without prior certification for the Master of Science degree.

Core Courses
Completion of the following 33.0 (secondary certification) credits or 42.0 (PreK-4) credits of core pedagogy courses allows for recommendation for PA Instructional I certification. View the requirements on the Post-Baccalaureate Teaching Certificate: Elementary Pre-K-4 and Secondary Concentrations (p. 398) page for additional information on requirements for specialization in subject areas.

Secondary Education Core Courses

EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDUC 558	Reading in the Content Areas	3.0

EDUC 565	Foundations in Instructing English Language Learners	3.0
Professional Electives		12.0
Total Credits		**45.0**

Elementary Education (PreK-4) Core Courses

EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 546	Literacy and Content Skill Development PreK-8	3.0
EDUC 506	Assessment of Young Learners	3.0
EDUC 513	Elementary Science Teaching Methods	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 521	Typical and Atypical Development in Early Childhood Education	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 529	Early Literacy	3.0
EDUC 539	Expressive Arts	3.0
EDUC 540	Field Experience (Graduate Student Teaching with Seminar)	3.0
EDUC 555	Social Studies Teaching Methods	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
MTED 517	Mathematics Methods and Content (PreK-4)	3.0
Professional Elective		3.0
Total Credits		**45.0**

Track II: Advanced Studies in Teaching, Learning and Curriculum

Students will complete a total of 45 credit hours consisting of seven core courses, two research courses, and six concentration courses in an approved area.

Core Courses

EDUC 530	Advanced Techniques in Instruction & Assessment	3.0
EDLT 532	Designing Virtual Communities for Staff Development - Non-Field Experience	3.0
EDUC 609	Language & Culture in Education	3.0
EDUC 714	Instructional and Curriculum Leadership	3.0
EDUC 813	Educational Issues Seminar	3.0
Select two courses from the following list:		6.0
EDPO 620	Education Policy: Concepts, Issues, and Applications	
EDUC 705	School Law and Politics	
EDUC 804	Program Evaluation in Organizations	
Research Courses		
EDUC 700	Classroom Research for Teachers I	4.5
EDUC 701	Classroom Research for Teachers II	1.5
Concentration Courses [*]		18.0
Total Credits		**45.0**

*   Students choose from the following concentration options with the approval of a graduate academic advisor and the program director:
- Educational Administration
- Global and International
- Instructional Technology
- Higher Education
- Customized Concentration (including other Drexel academic departments) e.g., ESL Program Specialist, Autism Spectrum Disorders, Educational Policy, Evaluation and Assessment

Education Faculty

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Multisensory Reading Instruction Level 1

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type:Post-Baccalaureate
Number of Credits to Completion: 12.0
Instructional Delivery: Campus, Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13-1315
Standard Occupational Classification (SOC) Code: 25-2022

Students completing this certificate would be become eligible to be certified Wilson Language Level 1 instructors by the Wilson Language Corporation.

The EDLS 621 course will enable teachers to implement a tier 1 and tier 2 Response to Intervention reading program for all students in grades K-1. The two other courses, EDLS 622 Basic Word Study I and EDLS 623 Basic Word Study II, will inform and instruct students on how to teach phonetics, including the six syllable types and the rules of the English language. Three additional practicum courses are offered for students to practice the techniques and theories taught in the courses. The practicums involve tutoring a student for 60 hours.

Admission Requirements

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA).
- Completed graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation - professional or academic.
- An essay describing why the applicant is interested in pursuing graduate study in this field.
- International Students must submit a TOEFL score indicating a minimum of 600 (paper exam) or 250 (CBT exam). For more information, view the International Students page.

Program Requirements

Required Courses

EDLS 620	Applied Methods in Multisensory Reading Instruction	1.0
EDLS 621	Multisensory Reading Instruction K/1	2.0
EDLS 622	Basic Word Study I	3.0
EDLS 623	Basic Word Study II	3.0
EDLS 624	Multisensory Practicum I	1.0
EDLS 625	Multisensory Practicum II	1.0
EDLS 626	Multisensory Practicum III	1.0
Total Credits		**12.0**

PhD in Educational Leadership Development and Learning Technologies

Major: Educational Leadership Development and Learning Technologies
Degree Awarded: Doctor of Philosophy
Calendar Type: Quarter
Total Credit Hours: 74.0
Classification of Instructional Programs (CIP) code: 13.9999
Standard Occupational Classification (SOC) code: 25-1199

About the Program

Vision

The PhD program in Educational Leadership Development and Learning Technologies is designed for those who aspire to be education researchers, university faculty or research analysts. The program is designed so that students will have the skills, knowledge and experience to be leaders and stewards of the field. Graduates from this program develop research and critical thinking abilities directed toward the creation of new knowledge, integration and original application and/or teaching of existing knowledge and scholarly inquiry in their field of study.

Applicants to this program are expected to have high aptitude for research and inquiry in the field of education. They will express career interest in topics into which the faculty of the school are actively inquiring and researching. The assumption is that the most effective training for the PhD stems from collaborative research and inquiry into topics of mutual interest by an able student and faculty scholars and researchers. The major emphasis of the program consists of the individual students and faculty members(s) jointly researching and inquiring into an area of study to conduct scholarly research.
In addition, two areas of concentration are available:

> **Leadership**
> Designed to introduce student to leadership characteristics, styles, and profiles along with the dynamics of the process of change in educational organizations. Students also systematically learn techniques to promote creative thinking, innovation, and change for educational leaders, as well as how to design effective program evaluations.

> **Science, Technology, Engineering, and Mathematics (STEM)**
> Designed to prepare students to become members of the STEM education community, through both reading, discussing, analyzing and criticizing important research from the science, technology, education, and mathematics education literature, synthesizing this work around common themes, and drawing practical conclusions within the students area of interest as well within the broader area of STEM education.

Mission

The emphasis of the program is philosophical underpinning and theory-driven research. In addition to study in educational leadership, policy and

the foundation of education, the program requires extensive preparation in quantitative and qualitative research methods. A small cohort of students will be admitted for full-time study. Students will be immersed in an internship to scholarly life, learning to teach and conducting research with faculty while completing coursework and other program requirements. These three areas will combine to:

- convey deep scholarly knowledge of education and related areas outside of education,
- promote a broad understanding of various methods of inquiry in education and develop competency in several of those methods,
- impart broad knowledge of theory and practice, and
- promote excellence as a college teacher.

Cohort and Delivery Format

This program will be limited to a cohort of full-time students for whom full funding is available and who will be fully embraced as members of the School of Education. The program will be delivered on-campus and will be situated in the framework of collaborative, transformational learning and knowledge generation. Small seminars, independent projects and practicum opportunities are designed for an individualized program.

Additional Information

For more information about this program, contact the program manager:

Jemina Williams
jtb84@drexel.edu
215-895-1965

Or visit the School of Education's Graduate Program (https://webedit.drexel.edu/soe/academics/graduate) website.

Admission Requirements

The ideal candidate will have a research-oriented master's degree in an area relevant to their desired specialization, a GPA of 3.25 (ideally 3.5 on a 4.0 scale) and competitive Graduate Record Exam (GRE) scores on each of the sub-tests: Verbal, Quantitative and Analytical.

All applicants are required to submit the following materials.

- Graduate School Application
- Official transcripts from all undergraduate and graduate study
- Official copies of GRE score reports sent directly to the Office of Graduate Admissions. International applicants who have not studied in the US, and whose first language is not English, are required to take the TOEFL and score 100 or higher (highest score is 120).
- Resume or curriculum vitae
- A statement of career goals, including specific research and scholarly interests. The applicant should be sure to indicate how their interests coincide with those of particular School of Education faculty members. (Visit our website for a list of current faculty research interests.)
- Three letters of reference from people familiar with prior academic performance
- Copies of students' scholarly writing, including published papers and theses or term papers

The School of Education admissions committee will review each application and, prior to acceptance, an interview may be required.

Early application is recommended; please refer to the current information available from the Office of Graduate Admissions for the application deadline.

Additional information about how to apply is available on the Graduate Admissions at Drexel University (http://www.drexel.edu/grad/programs/edu/educational-leadership-development-and-learning-technologies) site.

Degree Requirements

Course of Study

The PhD program of study involves formal coursework and informal experiences. The total minimum credits for the PhD degree is 74.0 credits, distributed among the following areas:

- Breadth and depth in education and educational research (12.0 credits)
- Research core (20.0 credits)
- Content concentration (27.0 credits)
- Mentored research experiences (6.0 credits)
- Dissertation research (9.0 credits minimum)

Research preparation is the foundation of the PhD program. Students begin research activities during the first year of the program, and continue to develop their skills by conducting various research projects with School of Education faculty, presenting research findings at conferences and writing research papers, culminating with the dissertation work. Thus, the program is designed to immerse the student in educational content, inquiry and methodology, so as to ask critical questions and design procedures to conduct research.

Required Courses

Breadth and Depth in Education Courses		12.0
EDUC 750 (p. 391)	Critical Issues in Education Seminar (3-credit course taken 3 times)	9.0
Elective		3.0
Research Core Courses		**20.0**
EDUC 803 (p. 391)	Educational Research Design I	3.0
EDUC 809 (p. 391)	Introduction to Data Collection and Analysis	3.0
EDUC 810 (p. 391)	Educational Research Design II	3.0
EDUC 815 (p. 391)	Writing for Research, Publication and Funding in Education	3.0
EDUC 835 (p. 391)	Quantitative Research Methods and Data Analysis	4.0
EDUC 836 (p. 391)	Qualitative Research Methods and Data Analysis	4.0
Concentration Courses		**27.0**
Students select either a concentration in Leadership or in STEM Education. All courses in the chosen concentration area must be completed.		
Leadership Concentration:		**27.0**
EDUC 800 (p. 391)	Educational Leadership & Change	3.0
EDUC 801 (p. 391)	Creative Strategies For Educational Leaders	3.0

EDUC 804 (p. 391)	Program Evaluation in Organizations	3.0
	12 credits of independent study/electives in concentration specialization area [*]	12.0
	6 credits of electives in specialization area outside of the School of Education [**]	6.0
STEM Education Concentration:		**27.0**
EDUC 840 (p. 391)	Theories of Individual Cognition in STEM Education	3.0
EDUC 842 (p. 391)	Social Foundation and Group Cognition in STEM Education	3.0
EDUC 844 (p. 391)	Creativity and Innovation in STEM Education	3.0
	12 credits of independent study/electives in concentration specialization area [*]	12.0
	6 credits of electives in specialization area outside of the School of Education [**]	6.0
Guided Research Experience		**6.0**
EDUC 799 (p. 391)	Independent Study: Learning through Problem-Based Research (course may be repeated for credit)	1.0-3.0
Required Doctoral Seminar and Dissertation [†]		**9.0**
EDUC 880 (p. 391)	Doctoral Seminar (1-credit seminar taken 3 times)	
EDUC 998 (p. 391)	PhD Dissertation (2-credits, 3 terms)	
Total Credits		**74.0**

[*] These courses are chosen in consultation with the student's faculty advisor. For the concentration in leadership, options students may choose include EDUC 804, EDUC 807, and/or EDUC 813.

[**] Electives outside of the School of Education are selected in consultation with the student's faculty advisor.

[†] 9.0 credits is the minimum to meet graduation requirements. Additional credits may be taken if required.

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD*. Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD *(Arizona State University)*. Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

José Luis Chávez, EdD *(University of Southern California.) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento*. Clinical Professor. Higher education leadership and administration.

Ellen Clay, PhD *(University of Southwestern Louisiana)*. Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.

Rebecca Clothey, PhD *(University of Pittsburgh) Director, Higher Education Program*. Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Marion Dugan, EdD *(University of Pennsylvania)*. Auxiliary Associate Professor. Language arts, student teaching.

Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD *(North Carolina State University) Director of the Human Resource Development (HRD) program at Drexel University.*. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD *(Michigan State University)*. Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities.

Kathy Geller, PhD *(Fielding Graduate University)*. Assistant Clinical Professor. Educational leadership and management.

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Dominic F. Gullo, PhD *(Indiana University)*. Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

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Jennifer Katz-Buonincontro, MFA, PhD *(University of Oregon)*. Assistant Professor. Educational administration.

Kristine Lewis, PhD *(Temple University)*. Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

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Sonya Martin, PhD *(Curtin University, Science and Mathematics Education Centre, Perth, Australia)*. Assistant Professor.

Michel Miller, PhD *(University of Miami, Florida)*. Auxiliary Assistant Professor. Special education.

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Ellen B. Scales, PhD *(Pennsylvania State University)*. Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD *(Vanderbilt University.) Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD *(University of Virginia)*. Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD *(Temple University) Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD *(Temple University)*. Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD *(University of Pennsylvania) Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD *(Syracuse University) Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Post-Bachelor's Certificate in Applied Behavior Analysis

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-baccalaureate
Number of Credits to Completion: 27.0
Instructional Delivery: Campus; Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Programs (CIP) Code: 42.2814
Standard Occupational Classification (SOC) Code: 19-3031

Behavior analysis is a widely accepted and validated scientific approach to the description and investigation of the environmental arrangements that occasion behavior. More than 60 years of research with proven methods and impressive findings has helped develop the technology now called applied behavior analysis. Over the past five decades, behavior analytic clinical and research advances have led to significant contributions in education programming, and mental health and behavioral health therapies.

The post bachelor's certificate in applied behavior analysis is designed to prepare clinical and educational leaders in the field of evidence-based interventions using behavior analytic theory and techniques. Leaders from this program will be highly successful candidates for institutions searching for knowledgeable and skilled behavior analytic consultants, program coordinators, senior clinical directors and interventionists.

Admission Requirements

Students applying to this program should have the following:

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA).
- Completed graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation - professional or academic.
- An essay describing why the applicant is interested in pursuing graduate study in this field.
- An interview, in person or by phone, will be conducted by the admissions committee with those applicants who meet Graduate Admission's standard admissions criteria.

Core Applied Behavior Analysis Courses

EDEX 630	Fundamental Elements of Behavior Change	4.5
EDEX 631	Measurement and Experimental Design	4.5
EDEX 632	Behavioral Assessment and Functional Analysis	4.5
EDEX 633	Behavioral Interventions	4.5
EDEX 634	Consultation, Systems Change and Supervision	4.5
EDEX 635	Ethical Considerations and Professional Conduct	4.5
Total Credits		**27.0**

The Behavior Analyst Certification Board, Inc.® has approved the Core Applied Behavior Analysis course sequence as meeting the coursework requirements for eligibility to take the Board Certified Behavior Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Additional Information

For more information about this program, contact:

Dr. Christina Vorndran
Associate Clinical Professor
Applied Behavior Analysis Program
cmv69@drexel.edu

Special Education 7-12 Post-Bachelor's Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 27.0
Instructional Delivery: Online, Campus

Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13-1205
Standard Occupational Classification (SOC) Code: 25-2054

The special education 7-12 certification program seeks to produce professionals who are equipped with the fundamental skills, knowledge, and competencies necessary to meet the needs of students at risk for school failure and students with disabilities in multiple settings.

This certificate program focuses on students at the secondary level. The special education 7-12 certification program is intended for those interested in gaining greater skills and expertise in the area of secondary special education and a teaching certificate in the area of secondary special education. Candidates seeking PA special education 7-12 certification must have an active PA Instructional I or Instructional II teaching certificate in a required area.

This program is a part-time graduate program consisting of 27.0 credits in core special education 7-12 certification courses. For students that have not completed the prerequisite courses, the program will require 36.0 credits; 27.0 credits in core special education 7-12 certification courses and 9.0 credits in prerequisite courses.

The program is designed for currently certified teachers who wish to obtain special education 7-12 certification in Pennsylvania. Out-of-state teachers may also earn their PA special education 7-12 certification if they transfer their current teacher certification to PA.

Admission Requirements

Students applying to this program should have the following:

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA).
- Completed graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation - professional or academic.
- An essay describing why the applicant is interested in pursuing graduate study in this field.

Program Requirements

Pre-requsites for Special Education 7-12 Certification [*]

EDEX 542	Fundamentals of Special Education	
EDEX 544	The Inclusive Classroom	
EDEX 566	Literacy and Content Skill Development 7-12	

Required Courses: 7-12 Special Education Certification Concentration

EDEX 548	Emotional and Behavioral Support of Individuals with Disabilities	4.5
EDEX 549	Teaching Individuals with High Incident Disabilities	3.0
EDEX 550	Teaching Individuals with Low Incident Disabilities	3.0
EDEX 551	Teaching Students with Autism Spectrum Disorder	4.5
EDEX 552	Integrating Technology for Learning & Achievement	3.0
EDEX 563	Special Education Practicum 7-12	4.5
EDEX 567	Special Education Processes 7-12	4.5
Total Credits		**27.0**

[*]   9.0 quarter credits total. All students entering this program from an approved PA certification program after 2011 should have had these three courses in their initial certification requirements. If a student does not have these courses, he or she must complete them with a minimum grade of "B" in addition to the required core certifcation courses.

A field component is required in most courses.

Additional Information:

For more information about this program, contact the program manager:

Owen Schugsta
School of Education
Drexel University
215.895.1690
ocs23@drexel.edu

Post-Bachelor's Certificate in Special Education Leadership

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 25.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.0402
Standard Occupational Classification (SOC) Code: 11-9039

The Post-Bachelor's Certificate in Special Education Leadership program is designed to produce educators who are equipped with the advanced skills, knowledge, and competencies necessary to lead programs that meet the needs of students at risk for and with disabilities in multiple settings.

The program requires 16.0 credits of special education leadership courses and 9.0 credits of leadership core courses (for a total of 25.0 credits). The courses in the leadership core focus on areas of change, finance, evaluation and assessment, and technology. Students must complete all courses and meet the prerequisite standards established by the PA Dept of Education for recommendation for the PA Supervisor of Special Education certification.

Admission Requirements

Students applying to this program should have the following:

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA).
- Completed graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation - professional or academic.

- An essay describing why the applicant is interested in pursuing graduate study in this field.

Leadership Core Courses

EDAM 522	Evaluation & Assessment Competencies	3.0
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
Special Education Leadership Concentration Courses		
EDEX 710	School Law & Policy in Special Education	3.0
EDEX 712	Instructional & Curriculum Leadership in Special Education	3.0
EDEX 714	Development, Supervision, & Support: Special Education Leadership	3.0
EDEX 716	Organization & Administration of Special Education	3.0
EDEX 721	Supervisor of Special Education Internship: Special Education Leadership	1.0
EDEX 722	Supervisor of Special Education Internship: Instructional Leadership	1.0
EDEX 723	Supervisor of Special Education Internship: Collaboration & Personnel	1.0
EDEX 724	Supervisor of Special Education Internship: Finance & Management	1.0
Total Credits		**25.0**

Additional Information:

For more information about this program, contact the program manager:

Owen Schugsta
School of Education
Drexel University
215.895.1690
ocs23@drexel.edu

Post-Bachelor's Teaching Certificate: Elementary Education

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 42.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.1202
Standard Occupational Classification (SOC) Code: 25-2021

This certificate program is designed for individuals who hold a bachelor's degree and who seek to qualify for Pennsylvania teacher certification at the elementary level. The curriculum is designed for those changing careers as well as those who already serve as temporary, emergency, or substitute teachers and wish to earn a formal teaching credential. Students completing the certification program have the option to continue coursework to earn MS in Teaching, Learning & Curriculum degree. All graduate credits earned in this certificate program may be applied toward the Master's degree in Teaching, Learning and Curriculum (p. 388).

The program will prepares students for a Pennsylvania Instructional I Certificate. Students also have the option of earning the Graduate Intern Teaching Certificate (p. 362) during the course of the program. The PA Graduate Intern Teaching Certificate feature is only available to students who want to teach in Pennsylvania.

For students intending to teach outside of Pennsylvania, through operation of interstate reciprocity agreements, a Pennsylvania teaching certificate may be converted to the analogous teaching certificate in another state. The School recommends prospective students contact their state's Department of Education to find out these transfer procedures before proceeding.

Certification Area

Drexel University's Pennsylvania Department of Education-approved programs certify students who already hold Bachelor's degrees to be teachers in Elementary Education (PreK-4).

Additional undergraduate content courses may be required. Learn more about undergraduate content course requirements for elementary or secondary certification in each subject.

Early Childhood/Elementary (PreK-4) Certification

EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 546	Literacy and Content Skill Development PreK-8	3.0
EDUC 506	Assessment of Young Learners	3.0
EDUC 513	Elementary Science Teaching Methods	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 521	Typical and Atypical Development in Early Childhood Education	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 529	Early Literacy	3.0
EDUC 539	Expressive Arts	3.0
EDUC 540	Field Experience (Graduate Student Teaching with Seminar)	3.0
EDUC 555	Social Studies Teaching Methods	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
MTED 517	Mathematics Methods and Content (PreK-4)	3.0
Total Credits		**42.0**

Education Faculty

W. Edward Bureau, PhD *(University of Pennsylvania) Director of the Sacramento EdD.* Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD *(Arizona State University).* Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

José Luis Chávez, EdD *(University of Southern California.) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento.* Clinical Professor. Higher education leadership and administration.

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Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

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Aroutis N. Foster, PhD *(Michigan State University)*. Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities.

Kathy Geller, PhD *(Fielding Graduate University)*. Assistant Clinical Professor. Educational leadership and management.

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Mary Jo Grdina, PhD *(Case Western Reserve University)*. Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

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Kristine Lewis, PhD *(Temple University)*. Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

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Sonya Martin, PhD *(Curtin University, Science and Mathematics Education Centre, Perth, Australia)*. Assistant Professor.

Michel Miller, PhD *(University of Miami, Florida)*. Auxiliary Assistant Professor. Special education.

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Ellen B. Scales, PhD *(Pennsylvania State University)*. Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD *(Vanderbilt University.) Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

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Fredricka K. Reisman, PhD *(Syracuse University) Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS *(Drexel University)*. Teaching Professor. Probability and statistics.

Special Education PreK-8 Post-Bachelor's Certificate

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 27.0
Instructional Delivery: Online; Campus
Calendar Type: Quarter
Expected Time to Completion: 3 years

Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.1001
Standard Occupational Classification (SOC) Code: 25-2059

The special education PreK-8 certification program seeks to produce professionals who are equipped with the fundamental skills, knowledge, and competencies necessary to meet the needs of students at risk for school failure and students with disabilities in multiple settings.

This certificate program focuses on students from the prekindergarten to middle school levels. The special education PreK-8 certification program is intended for those interested in gaining greater skills and expertise in the area of PreK-8 special education and a teaching certificate in the area of PreK-8 special education. Candidates seeking PA special education PreK-8 certification must have an active PA Instructional I or Instructional II teaching certificate in a required area.

This program is a part-time graduate program consisting of 27.0 credits in core special education PreK-8 certification courses. For students that have not completed the prerequisite courses, the program will require 36.0 credits: 27.0 credits in core special education PreK-8 certification courses and 9 credits in prerequisite courses.

The program is designed for currently certified teachers who wish to obtain special education PreK-8 certification in Pennsylvania. Out of state teachers may also earn their PA special education PreK-8 certification if they transfer their current teacher certification to PA.

The courses cover all required state and federal regulations related to No Child Left Behind (NCLB) and Chapter 49 as well as the PA General Standards for Special Education and the standards outlined by the Council of Exceptional Children (CEC).

Admission Requirements

Students applying to this program should have the following:

- Bachelor's degree from a regionally accredited institution.
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA).
- Completed graduate school application.
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended.
- Two letters of recommendation - professional or academic.
- An essay describing why the applicant is interested in pursuing graduate study in this field.

Program Requirements

Pre-requisites for Certification in Special Education (PreK-8)
Students must have completed the following courses in order to apply for a Pennsylvania Special Education PreK-8 certification. All students entering the post-bachelor's certificate program after 2011 should have had these core courses in their initial certification program. If a student has not completed the following three courses, they should be taken to apply for special education certification:

EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 546	Literacy and Content Skill Development PreK-8	3.0

Core Certification Courses

EDEX 547	Special Education Processes PreK-8	4.5
EDEX 548	Emotional and Behavioral Support of Individuals with Disabilities	4.5
EDEX 549	Teaching Individuals with High Incident Disabilities	3.0
EDEX 550	Teaching Individuals with Low Incident Disabilities	3.0
EDEX 551	Teaching Students with Autism Spectrum Disorder	4.5
EDEX 552	Integrating Technology for Learning & Achievement	3.0
EDEX 553	Special Education Practicum PreK-8	4.5
Total Credits		**27.0**

A field component is required in each course.

Additional Information:

For more information about this program, contact the program manager:

Owen Schugsta
School of Education
Drexel University
215.895.1690
ocs23@drexel.edu

Post-Bachelor's Teaching Certificates: Secondary Education

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 33.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.1205
Standard Occupational Classification (SOC) Code: 25-2031

These certificate programs are designed for individuals who hold a bachelor's degree and who seek to qualify for Pennsylvania teacher certification at the secondary level. The curriculum is designed for those changing careers as well as those who already serve as temporary, emergency, or substitute teachers and wish to earn a formal teaching credential. Students completing the certification program have the option to continue coursework to earn MS in Teaching, Learning & Curriculum degree. All graduate credits earned in this certificate program may be applied toward the Master's degree in Teaching, Learning and Curriculum (p. 388).

The program will prepares students for a Pennsylvania Instructional I Certificate. Students also have the option of earning the Graduate Intern Teaching Certificate (p. 362) during the course of the program. The PA Graduate Intern Teaching Certificate feature is only available to students who want to teach in Pennsylvania.

For students intending to teach outside of Pennsylvania, through operation of interstate reciprocity agreements, a Pennsylvania teaching certificate may be converted to the analogous teaching certificate in another state. The School recommends prospective students contact their state's Department of Education to find out these transfer procedures before proceeding.

Certification Areas

Drexel University's Pennsylvania Department of Education-approved programs certify students who already hold Bachelor's degrees to be teachers in Secondary Education (7-12):

- biology
- chemistry
- physics
- earth and space science
- general science
- environmental education
- English
- social studies
- mathematics

Additional undergraduate content courses may be required. Learn more about undergraduate content course requirements for secondary certification in each subject.

Secondary Biology Certification

Core Pedagogy Courses		
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Secondary Chemistry Certification

Core Pedagogy Courses		
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Secondary Earth and Space Science Certification

Core Pedagogy Courses		
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0

EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Secondary English Certification

Core Pedagogy Courses		
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 538	English Teaching Methods	3.0
EDUC 540	Field Experience	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Environmental Education (K-12) Certification

Core Pedagogy Courses		
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Secondary General Science Certification

Core Pedagogy Courses		
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDEX 542	Fundamentals of Special Education	3.0

EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Secondary Mathematics Certification

EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
MTED 519	Teaching Secondary Mathematics	3.0
Total Credits		**33.0**

Secondary Physics Certification

Core Pedagogy Courses		
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 514	Science Teaching Methods	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Secondary Social Studies Certification

Core Pedagogy Courses		
EDEX 542	Fundamentals of Special Education	3.0
EDEX 544	The Inclusive Classroom	3.0
EDEX 566	Literacy and Content Skill Development 7-12	3.0
EDUC 515	Adolescent Learners in Secondary Schools	3.0
EDUC 520	Professional Studies in Instruction	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 540	Field Experience	3.0
EDUC 556	Secondary Social Studies Methods (7-12)	3.0
EDUC 558	Reading in the Content Areas	3.0
EDUC 565	Foundations in Instructing English Language Learners	3.0
Total Credits		**33.0**

Reading Specialist Certificate

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate Certificate
Number of Credits to Completion: 31.0
Instructional Delivery: Campus
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1315
Standard Occupational Classification (SOC) Code: 25-2022; 25-2031

The Reading Specialist Certificate Program was developed in response to the local and national need for training teachers who are skilled literacy instructors no matter what grade or subject they teach, the School of Education's faculty seeks to create a new stand alone reading certificate program for teachers who already hold have at least an instruction I teaching certificate in PA, and to offer a new reading specialist certificate for inservice teachers who are seeking to become experts as reading teachers and literacy leaders in their classroom, schools, and districts, or ones who want to obtain a dual certification as a Reading Specialist and another content area. Additionally, students in the Reading Specialist Certificate program will obtain a Wilson certificate when they complete the 31-credit program because 3 Wilson reading courses and 3 Wilson practicum courses are a part of the core curriculum for this program.

The Reading Specialist Certificate Program is designed for teachers who already possess an Instructional I certificate in PA or another State who has a desire to become literacy coach, a literacy program/curriculum consultant (for a school, literacy center, etc.), a reading intervention specialist, or to supplement existing knowledge/skills in developing expertise as a reading instructor. The program is designed for teachers who want to obtain another certification as a Reading Specialist. Through reciprocity agreements among the states, graduates can transfer their certification in almost any state across the United States.

Reading Specialist Certificate Requirements:

EDLS 550	Theories of Reading and Writing	3.0
EDLS 555	Understanding Literacy through Sociocultural Perspectives	3.0
EDLS 560	Reading and Writing in the Content Areas (7-12)	3.0
EDLS 565	Constructing Meaning through Reading and Writing	3.0
EDLS 570	Literacy and Evaluation	3.0
EDLS 575	Responding to Children's and Young Adult Literature	3.0
EDLS 620	Applied Methods in Multisensory Reading Instruction	1.0
EDLS 622	Basic Word Study I	3.0
EDLS 623	Basic Word Study II	3.0
EDLS 624	Multisensory Practicum I	1.0
EDLS 625	Multisensory Practicum II	1.0
EDLS 626	Multisensory Practicum III	1.0
EDLS 650	Designing a Literacy Program	3.0
Total Credits		**31.0**

STEM Education Certificate

Certificate Level: Graduate

Admission Requirements: Bachelor's degree
Certificate Type: Graduate
Number of Credits to Completion: 12.0
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1316
Standard Occupational Classification (SOC) Code: 25-2022; 25-2031

The Certificate in STEM embraces the School of Education's and Universities focus on STEM education. The program creates an opportunity for those individuals who want to gain further understanding of STEM and provides the comprehensive education needed to effectively teach STEM concepts, as well as integrates strategies within the curriculum to effectively enhance student performance in STEM areas. The primary goal for the certificate in STEM Education is to broaden and deepen students' understanding of STEM education.

Admission Requirements

- Bachelor's degree from a regionally accredited institution
- Two letters of recommendation
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended
- Completed Application Form
- Undergraduate GPA of 3.0 or higher (graduate GPAs will be considered along with the undergraduate GPA
- An essay describing why you are interested in pursuing graduate study in this field
- International Students must submit a TOEFL score indicating a minimum of 600 (paper exam) or 250 (CBT exam).

Program Requirements

Required Courses

EDUC 840	Theories of Individual Cognition in STEM Education	3.0
EDUC 842	Social Foundation and Group Cognition in STEM Education	3.0
EDUC 844	Creativity and Innovation in STEM Education	3.0
Capstone course (select one):		
EDUC 514	Science Teaching Methods	3.0
or MTED 519	Teaching Secondary Mathematics	
Total Credits		**12.0**

School Principal Certificate

Certificate Level: Graduate
Admissions Requirements: Bachelor's
Certificate Type: Graduate
Number of Credits to Completion: 24.0 (if not pursuing MS program); 45.0 (if pursuing of MS program)
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 13.0408 / 13.0409
Standard Occupational Classification (SOC) Code: 11-9032

The School Principal Certificate program was designed to produce school leaders who are knowledgeable about current theories and strategies in leadership and change. Components of the program's conceptual bedrock are heuristic diagnostic learning, intelligent use of emotions in interpersonal skills of leadership, creative problem solving, and learning technologies.
The School Superintendent (Letter of Eligibility) available in the Ed.D. program was designed to offer future school district leaders current research-based knowledge in creative instructional, community, and technological leadership.

Admission Requirements

Applicants come from a variety of undergraduate and graduate backgrounds and typically desire to provide leadership for change as a school principal. The School Principal Certification is available for teachers or counselors who already possess initial teaching certificates and requires a minimum of three years of professional experience to apply for certification. Applicants must meet the general admissions requirements for graduate studies at Drexel University.

Program Requirements

Students will not be recommended for the School Principal Certificate until all course requirements are met, initial teaching certificate has been received, and all required sections of the Praxis Exams have been taken, and three years of satisfactory professional school experience have been completed. Minimum coursework requirements for the School Principal Certificate include 24.0 credits of specific pedagogy as outlined below. These credits may be incorporated into the graduate Teaching, Learning, and Curriculum program or into the electives portion of another approved Drexel master's degree program. Students must achieve the grade of B or better in each graduate level course needed for certification and receive passing Praxis Exam scores in order to satisfy requirements for the desired certification.

Core Certification Courses

EDUC 702	School Leadership & Decision Making	3.0
EDUC 705	School Law and Politics	3.0
EDUC 708	Integration of Technology with School Instruction and Management	3.0
EDUC 710	School Finance and Facilities	3.0
EDUC 712	School and Community Partnerships and Relations	3.0
EDUC 714	Instructional and Curriculum Leadership	3.0
EDUC 715	School Principal Internship: Technology	1.5
EDUC 716	School Principal Internship: Finance	1.5
EDUC 717	School Principal Internship: Leadership	1.5
EDUC 718	School Principal Internship: School and Community Relations	1.5

Must have a prior master's degree and teacher credential for admission.

Students working toward School Principal Certification engage in a corresponding one-credit school-based internship when enrolled in EDUC 708 (p. 401), EDUC 710 (p. 401), EDUC 712 (p. 401), and EDUC 714 (p. 401), related to each course's content.

Students who possess a valid state-issued teacher or counselor certification and have completed a minimum of three years of satisfactory professional school experience upon successful completion of theses core courses, and who also meet the current state minimum score on the appropriate Praxis Exam may apply for School Principal Certification and continue working toward the master's degree requirements.

Master of Science Degree Requirements
Once students complete the 24.0 core credits for the School Principal certification, an additional 21.0 core credits of Educational Administration courses are necessary to finish the Master of Science degree.

Teaching English as a Second Language

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 16.5
Instructional Delivery: Online, Campus
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 13.1401
Standard Occupational Classification (SOC) Code: 25-2031

Teaching English as a second language certification is an add-on certificate available to students that currently possess a Pennsylvania Instructional I or Instructional II teaching certificate. The 16.5 credit ESL certificate program covers the theory and practice of second language education, the structure and sound of English, the design and assessment of ESL course materials, as well as broader issues in intercultural learning. Completion of the program also includes field-based experiences and a capstone action research project, under the guidance of an ESL Program Specialist. It does not require that the instructor speak another language. Credits earned through this program may be applied toward the MS in the Science of Instruction, or the MS in Teaching, Learning and Curriculum (p. 388).

This program satisfies PA State of Education requirements for Program Specialist: ESL endorsement. Interstate agreements generally allow applicability across the US. However, prospective students outside of Pennsylvania are advised to check with their state authorities to determine whether this program is appropriate for their case.

Courses

LING 560	Introduction to Linguistics	3.0
EDUC 602	Language Learning & Teaching	3.0
EDUC 604	Structure and Sound System of English	3.0
EDUC 606	Design and Assessment	3.0
EDUC 608	The Intercultural Learner	4.5
Total Credits		**16.5**

First Year

Term 1		Credits
EDUC 602	Language Learning Teaching	3.0
LING 560	Introduction to Linguistics	3.0
	Term Credits	**6.0**
Term 2		
EDUC 604	Structure and Sound System of English	3.0
EDUC 606	Design and Assessment	3.0
	Term Credits	**6.0**
Term 3		
EDUC 608	The Intercultural Learner	4.5
	Term Credits	**4.5**

Total Credit: 16.5

The School of Public Health

About the School

The Dornsife School of Public Health promotes the health of communities through an integrated program of education, research, service and practice. The School is committed to identifying societal conditions required for people to be healthy, and to advancing practices that improve the health of vulnerable populations. The School enhances the health of communities by creating partnerships based on community values, strengths and assets. Its curriculum, stresses the importance of understanding and addressing the connection between human rights and health status.

The mission of the Dornsife School of Public Health (http://publichealth.drexel.edu) is to promote health and quality of life through graduate education, applied research, and community service in the prevention and control of disease, injury, and disability. The curriculum combines knowledge of the disciplines of public health and practical applications of that knowledge. By working collaboratively with community groups, agencies, and populations, professionals are prepared to effectively address today's most pressing public health problems.

Preparation and Partnership

The School believes that professionals can best meet the needs of today and tomorrow with expertise in the integration and practical application of all disciplines of public health. The School of Public Health's educational and research programs are built upon partnerships with communities and the organizations that serve them.

The School prepares professionals to assess population health; to ensure appropriate services through programmatic, economic, and organizational interventions; and to develop and evaluate policy interventions.

Majors

- Biostatistics (MS, MPH) (p. 403)
- Community Health and Prevention (MPH, DrPH) (p. 409)
- Epidemiology (MS, MPH, PhD, MD/MPH) (p. 422)
- Environmental and Occupational Health (MPH) (p. 418)
- Health Management and Policy (MPH) (p. 431)
- Health Policy and Social Justice (DrPH) (p. 414)
- Public Health (MPH) (p. 434)
- Public Health - Executive Program (MPH) (p. 427)

Certificates

- Epidemiology and Biostatistics (p. 408)
- Global Health (p. 408)
- Lesbian, Gay, Bisexual and Transgender Health (LGBT) (p. 409)

Biostatistics

Major: Public Health
Degree Awarded: Master of Science (MS) or Master of Public Health (MPH)
Calendar Type: Quarter

Total Credit Hours: 58.0 (MS); 64.0 (MPH)
Classification of Instructional Programs (CIP) code: 26.1102
Standard Occupational Classification (SOC) code: 15-2041

About the Programs

Master of Science

Biostatistics applies statistical, mathematical and computational techniques to scientific research in health-related fields, including medicine, epidemiology, and public health. Biostatistics has been an integral and indispensable tool in improving health and reducing illness. Biostatisticians play essential roles in designing studies and analyzing research data. Graduates with degrees in biostatistics are employed in public health research and service organizations, university research groups, hospitals, pharmaceutical companies, health-related industries and government. The demand for biostatisticians in the job market has been consistently strong. New high throughput technologies such as gene microarray are generating an unprecedented amount of data and present exciting new opportunities for biostatisticians with strong computational skills.

The goal of Drexel University's MS Program in Biostatistics is to provide students with a thorough understanding of biostatistical methods, strong computational skills, and the ability to apply this knowledge to research focusing on health related problems. The program prepares students for handling the quantitative and computational aspects of a research project, ranging from study design, data collection and management, developing analysis plans, and conducting analyses and reporting findings. The MS in Biostatistics program includes course work in statistical theory and methods, computing and data management, epidemiology, and general public health topics. Incorporated into the second year is a quarter-long practicum experience working on a real academic, government, or industry project in a sponsoring organization setting. The practicum-based research project will involve the application of biostatistical analysis to a problem of significance to the sponsoring academic, government or industry organization with joint oversight provided by a Department faculty member and an on-site PhD level biostatistician.

Upon graduation MS students will attain competencies in the following three areas: general public health knowledge, biostatistics knowledge, data management and computing skills.

For additional information about the program, visit The Dornsife School of Public Health (http://publichealth.drexel.edu) web site.

Master of Public Health

The Master of Public Health program is intended for individuals interested in careers as community educators; population health planners; policy analysts, evaluators, researchers; and managers of health service delivery organizations and systems, managed-care programs, and other population-based organizations.

The 64.0 quarter-credit program is interdisciplinary and requires students to complete a community-based master's project. It prepares students to enter an array of fields related to public health or a range of doctoral programs. Drexel University's Master of Public Health (MPH) program provides practical skills and experience, with a unique focus on relevant community issues, challenges, and priorities.

Program Highlights

The first year of the program covers the five core disciplines offered within the context of culture and community. These include environmental and

occupational health; health care systems organization, management, and policy; social and behavioral sciences for population health; epidemiology; biostatistics. Throughout the program, group case discussion sessions, case-related activities and didactic sessions are integrated into the experience.

These include:

- Skill development labs and workshops (year two)
- Public health grand rounds (for all faculty, students, and community partners) provide access to scholars and their cutting-edge research and initiatives in public health

Curriculum

The MPH full-time educational program is structured on a quarter-term basis, with a total of 64.0 credit hours required. This is generally taken as a two-year program; all coursework must be completed within five years of the date of matriculation for the full-time program.

The second-year curriculum is composed of four required courses, three elective courses, and the Community-Based Master's Project (CBMP), the culminating experience required of full-time Drexel MPH students. Students spend approximately 12 hours each week working on a community-oriented, health-related project, often working as an integral part of a community-based organization. This can be in the areas of government, healthcare and social services, among others.

In preparation for developing their final paper, students are required to identify an issue or problem of significance to the target community or agency, synthesize the literature, develop an approach or methodology to address the issue and either implement and test the validity of a proposed approach or set out a detailed prescription for addressing the problem. Students may also work with faculty in specific research areas.

Joint Doctor of Medicine and Master of Public Health Degree (MD/MPH)

Students wishing to complete a course of study earning the joint MD/MPH degree can complete such a program in 5 years. They must apply for the joint program and be accepted by both the Drexel University College of Medicine and the Dornsife School of Public Health. Students in this program have enriched public health content in their first two years of medical school and spend their third year of study full time in the Dornsife School of Public Health. Students are able to enter clinical rotations and residency selection having obtained the MPH degree.

Additional Information

For additional information about this program, contact:
Stephanie Johnson
snj22@drexel.edu
267.359.6065

Admission Requirements

Applicants to the MS in Biostatistics must meet the following requirements, having:

- a baccalaureate degree, ideally in a quantitative field such as mathematics, economics and computer science or a scientific area such as natural, biological, medical and environmental sciences.
- at least two semesters of calculus in college.
- at least one semester of linear algebra in college.

- knowledge and experience in computing such as operating system, office software and Internet. Familiarity with a programming language or a statistical package is desirable.

The application package will include:

- undergraduate and graduate transcripts
- three letters of recommendation from faculty or professionals who can evaluate the applicant's promise as a graduate student
- Graduate Record Examination (GRE) scores
- a written statement of career and educational goals

Degree Requirements

Completion of the MS in Biostatistics requires: (1) a minimum of 51.0 credit hours of course work; (2) a cumulative grade point average of 3.0 or higher; (3) a substantial data analysis project (6 credit hours) with a written report (30-50 pages) and oral presentation.

Required Public Health Courses		
PBHL 516	Introduction to Public Health	2.0
Required Biostatistics Courses		
PBHL 622	Statistical Inference I	3.0
PBHL 623	Introduction to Statistical Computing	3.0
PBHL 625	Longitudinal Data Analysis	3.0
PBHL 628	Survival Data Analysis	3.0
PBHL 631	Applied Multivariate Analysis	3.0
PBHL 683	Advanced Clinical Trials & Experiment Design	3.0
PBHL 684	Statistical Inference II	3.0
PBHL 686	Advanced Statistical Computing	3.0
PBHL 685	Data Analysis Project	6.0
PBHL 694	Biostatistical Literature Review	1.0
PBHL 695	Statistical Consulting	2.0
PBHL 696	Nonparametric and Semiparametric Models	3.0
PBHL 697	Generalized Linear Model	3.0
PBHL 698	Linear Statistical Models	3.0
Required Epidemiology Courses		
PBHL 530	Principles of Epidemiology	4.0
PBHL 630	Intermediate Epidemiology	3.0
Complete 2 of the following:		6.0
BIO 631	Bioinformatics I	
BIO 640	Biometry	
MATH 510	Applied Probability and Statistics I	
MATH 511	Applied Probability and Statistics II	
PBHL 632	Applied Survey Research in Epidemiology	
PBHL 804	Research Methods for Community Health and Prevention	
PBHL 830	Advanced Epidemiology	
STAT 628	Applied Regression Analysis	
Total Credits		**57.0**

Degree Requirements

Foundation Courses		25.0
PBHL 516	Introduction to Public Health	

PBHL 520	Principles of Biostatistics	
PBHL 530	Principles of Epidemiology	
PBHL 540	Prevention Principles and Practices	
PBHL 600	Management, Leadership, Assurance and Health Services	
PBHL 640	Environmental Health	
PBHL 650	Public Policy and Advocacy	
Required Community-Based Master's Project Courses		12.0
PBHL 680	Community Based Master's Project I	
PBHL 681	Community Based Master's Project II	
PBHL 682	Community Based Master's Project III	
Required Courses		15.0
PBHL 620	Intermediate Biostatistics I	
PBHL 621	Intermediate Biostatistics II	
PBHL 623	Introduction to Statistical Computing	
PBHL 630	Intermediate Epidemiology	
and choose 1 of the follow:		
PBHL 622	Statistical Inference I	
PBHL 629	Design & Analysis of Clinical Trials	
PBHL 683	Advanced Clinical Trials & Experiment Design	
PBHL 691	Pathophysiology Basis of Epidemiologic Research	
PBHL 692	Public Health Obesity Prevention Research	
Electives [*]		12.0

Students are required to successfully complete four electives (12.0 credits). These courses may be within the School of Public Health, or from other academic units within the University. Students must meet with their Academic Advisor in selecting their electives. It is the responsibility of the student to determine course restrictions and the registration process for campus electives taken at the Main Campus. The following is a sample of some of the School of Public Health electives offered by department:

Biostatistics Electives	
PBHL 622	Statistical Inference I
PBHL 628	Survival Data Analysis
PBHL 629	Design & Analysis of Clinical Trials
PBHL 631	Applied Multivariate Analysis
PBHL 657	Data Management
PBHL 683	Advanced Clinical Trials & Experiment Design
PBHL 684	Statistical Inference II
PBHL 686	Advanced Statistical Computing
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research
PBHL 693	Applied Bayesian Analysis
PBHL 696	Nonparametric and Semiparametric Models
PBHL 699	Biostatistical Computing with Stata
Community Health and Prevention Electives	
PBHL 674	Studying Rare or Hidden Groups
PBHL 675	LGBT Health Disparities
PBHL 676	Intersectional Perspectives
PBHL 678	Drug Use and Public Health
PBHL 801	Theory & Practice of Community Health & Preventions I

PBHL 803	Theory & Practice of Community Health and Preventions II
PBHL 804	Research Methods for Community Health and Prevention
PBHL 805	Qualitative Research in Community Health
PBHL 808	Community Program Evaluation
PBHL 810	Practicum in Community Health and Prevention
PBHL 814	Community Based Participatory Research
PBHL 823	Faith, Religion, Spirituality, and Health
PBHL 824	Public Health Ethics
PBHL 827	Advanced Topics in Qualitative Analysis
Environmental and Occupational Health Electives	
PBHL 560	Overview of Issues in Global Health
PBHL 642	Healthy Housing & Built Environment
PBHL 645	Exposure Assessment
PBHL 646	Environmental Health in Vulnerable Populations
PBHL 648	Public Health and Disaster Preparedness
PBHL 649	Occupational and Environmental Cancers
PBHL 663	Injury Prevention and Control
PBHL 664	Safety in Healthcare
Epidemiology Electives	
PBHL 532	Autism as a Public Health Challenge
PBHL 633	Epidemiology of Cancer
PBHL 635	Social Epidemiology and Psychiatric Epidemiology
PBHL 636	Infectious Disease Epidemiology
PBHL 638	Perinatal Epidemiology
PBHL 639	Cardiovascular Disease Epidemiology & Prevention
PBHL 655	Making Sense of Data
PBHL 656	Pharmacoepidemiology
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research
Health Management and Policy Electives	
PBHL 604	Public Health Advocacy and Activism
PBHL 606	Vaccines and Public Health Policy
PBHL 610	Active Issues in Public Health
PBHL 612	Public Health Funding & Program Development
PBHL 613	Seminar in Fire Arms and Public Health
PBHL 614	Coordinating a Population's Care
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class
PBHL 616	Public Health Surveillance: Aligning Data and Policy Use
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic
PBHL 618	Historical and Contemporary Developments in Social Justice
PBHL 652	Public Health Leadership
PBHL 802	Health and Human Rights
PBHL 851	Health Systems Policy Analysis
PBHL 852	Health Economics I
PBHL 853	Health Economics II
PBHL 854	The Politics of Food & Gender

PBHL 856	Violence, Trauma and Adversity in Public Health

Total Credits   **64.0**

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology.* Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy.* Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education.* Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy.* Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health.* Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health.* Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health.* Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy.* Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health.* Associate Teaching Professor. Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention.* Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law.* Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives.* Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health.* Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy.* Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School).* Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics.* Associate Professor. Statistics, experimental design/research methods and statistical analysis, clinical trials.

William J. Hickey, PhD *(Northwestern University) Department of Health Management and Policy.* Associate Teaching Professor. Organization behavior, health care administration.

Warren Hilton, MA *(Indiana University of Pennsylvania) Assistant Dean for Student and External Affairs.* Assistant Teaching Professor. Leadership development, organizational management, health disparities training.

Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics.* Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research.* Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy.* Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention.* Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

Brian K. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor.

Neuroepidemiology, autism, dementia, environmental risk factors, gene-environmental interaction, propensity score methods, machine learning, stress.

Nora L. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Perinatal epidemiology; low birth weight; preterm birth; macrosomia; maternal and child health; second-hand smoke; environmental exposures; autism spectrum disorders; China.

Longjian Liu, MD, MSC, PhD *(University of Hong Kong) Department of Epidemiology and Biostatistics.* Associate Professor. Nutrition, aging, cross-cultural and racial/ethnic variation and health.

Raymond K. Lum, MPhil, MS *(University of Pennsylvania) Department of Health Management and Policy.* Associate Teaching Professor. Organizational learning theory, change management, systems thinking, innovation diffusion, technology transition, e-health.

Shannon Marquez, MEng, PhD *(University of North Carolina Gillings School of Global Public Health) Director of Global Public Health Initiatives, Interim Associate Dean.* Associate Professor. Agricultural safety, health disparities, environmental health, international health.

Yvonne Michael, ScD *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Associate Professor. Epidemiology of aging, social epidemiology, women's health, community-based participatory research.

Jana M. Mossey, PhD, MPH, MSN *(University of North Carolina) Department of Epidemiology and Biostatistics.* Professor. Epidemiological methods; research design and methods including observational and clinical trials research; psychosocial aspects of health; epidemiology of aging; depression and chronic pain; sub-threshold and minor depression; pain in the elderly.

Craig J. Newschaffer, PhD *(Johns Hopkins University) Chair, Department of Epidemiology and Biostatistics.* Professor. Development of methods for monitoring autism spectrum disorders prevalence; participation in the National CADDRE Study of Autism and Child Development.

Hernando Perez, PhD, MPH, CIH, CSP *(Purdue University) Department of Environmental and Occupational Health.* Assistant Teaching Professor. Children's environmental health, housing and health, environmental and occupational exposure assessment.

Marcia Polansky, MS, ScD, MSW *(Harvard University) Department of Epidemiology and Biostatistics.* Associate Professor. Biostatistics; experimental design/research methods and statistical analysis, clinical trials; asthma epidemiology and interventions; attachment theory and mothers with drug and alcohol addictions.

John A. Rich, MD, MPH *(Duke University Medical School) Interim Dean, Dornsife School of Public Health; Chair, Department of Health Management and Policy.* Professor. Inner-city health problems, urban violence, male health and racial disparities.

Lucy Robinson, PhD *(Columbia University) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; statistical analysis; spatial statistics/epidemiology; application of statistics to behavioral, biological and medical sciences; environmental health; neurological disorders.

John Rossi, VMD, M.Bioethics *(University of Pennsylvania) Department of Community Health and Prevention.* Assistant Professor. Bioethics and public health ethics, including moral theory, research ethics, ethics of risk & health communication, pediatric ethics, animal ethics.

Randall L. Sell, ScD *(Harvard University) Department of Community Health and Prevention.* Associate Professor. Demographic variables, defining and measuring sexual orientations, sampling sexual minorities for public health research.

David Barton Smith, PhD *(The University of Michigan School of Public Health) Department of Health Management and Policy.* Research Professor. Racial disparities in healthcare, long term care policy, health services research and program evaluation.

Loni Philip Tabb, PhD *(Harvard School of Public Health) Department of Community Health and Prevention.* Assistant Professor. Methods for categorical, missing and hierarchical data, spatial epidemiology/statistics.

Jennifer A. Taylor, PhD, MPH *(Johns Hopkins University) Department of Environmental and Occupational Health.* Associate Professor. Injury prevention and control, quality improvement, and occupational safety.

Renee M. Turchi, MD, MPH *(Johns Hopkins University) Department of Community Health and Prevention.* Associate Professor. Medical Home; children and youth with special health care needs; care coordination; cultural competency and access to care.

Nicole A. Vaughn, PhD *(Uniformed Services University of the Health Sciences) Department of Health Management and Policy.* Assistant Professor. Community-based approaches to eliminating health disparities, health care access and utilization among insured and uninsured minority groups, obesity, women's health and the influence of culture on health behaviors particularly for chronic conditions.

Augusta M. Villanueva, PhD *(University of Texas at Austin) Department of Community Health and Prevention.* Associate Professor. Role of race, culture, and ethnicity on health status/outcomes; community-based participatory research; immigrant communities; academic service-learning.

Seth Welles, PhD, ScD *(Boston University) Department of Epidemiology and Biostatistics.* Professor. Impact of HIV phenotypic and genotypic antiretroviral drug resistance on HIV disease progression and transmission; psychosocial risk for HIV infection and STDs among sexual minority adults and adolescents, and surveys of sexual minority adults at community festivals and at health-clinics to assess demographic and psychosocial determinants of sexual risk-taking and HIV/STD infections.

Yunwen Yang, PhD *(University of Illinois at Urbana-Champaign) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; bayesian methods; application of statistics to behavioral, biological and medical sciences; mixed methods.

Michael Yudell, MPH, MPhil, PhD *(Columbia University, City University of New York) Department of Community Health and Prevention.* Associate Professor. Public health genomics; bioethics; history of public health; and addiction.

Issa Zakeri, PhD *(University of Illinois and Urbana-Champaign) Department of Epidemiology and Biostatistics.* Professor. Biostatistics.

Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University).* Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Certificate in Epidemiology and Biostatistics

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time To Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 26.1309
Standard Occupational Classification (SOC) Code: 19-1041

The Certificate in Epidemiology and Biostatistics offered by Drexel University's School of Public Health, is an interdisciplinary program designed for working professionals of diverse backgrounds, including public health administrators, physicians, nurses, clinical research professionals, health educators, and policy experts.

Never before has disease prevention and health promotion been more important. As world events develop, with the added threat of bioterrorism and other emerging public health issues, those who can apply knowledge gained through research to real-world problems are in great demand across all sectors: health care, pharmaceuticals, governmental and non-governmental agencies, business, and academia.

The certificate program is supervised by the School of Public Health's director of eLearning and the department chair. The program is administered through Drexel University Online. Applications to the certificate program are managed by Drexel University Online. For the most current admission information, please visit www.drexel.com (http://www.drexel.com).

About the Curriculum

The certificate program provides research-oriented training in the theory and tools of core public health disciplines. Students build the statistical background needed to conduct research, develop hypotheses, analyze data, and interpret and communicate results.

The certificate program consists of three sequential 3.0 credit courses. Each course is taught over a 10-week period, allowing completion of the certificate within a 30-week period. The curriculum reflects core epidemiological and biostatistical concepts and practices in a similar manner to the full-time and Executive MPH programs. Contact between faculty and students creates an intense experience over this exclusively online format. The online format allows asynchronous learning while providing flexibility for adult learners constrained by physical and time limitations.

Requirements

PBHL 701	Introduction to Descriptive Epidemiology and Biostatistics	3.0
PBHL 702	Introduction to Analytic Epidemiology and Biostatistics	3.0
PBHL 703	Design and Analysis Epidemiological Studies	3.0
Total Credits		**9.0**

Additional information

For more information about the program, visit the Certificate in Epidemiology & Biostatistics (http://www.drexel.com/online-degrees/public-health-degrees/cert-epi-bio) on the Drexel Online University web site.

Certificate in Global Health

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 51.2210
Standard Occupational Classification (SOC) Code: 21-1091

This online certificate in global health is designed to train post-baccalaureate students and public health professionals for a career in global health and development, including in international settings. The program stresses the development of analytic and technical skills required for pursing further work in the growing areas of global health and international development. The curriculum focuses on designing, implementing, and evaluating programs in under-served communities in the US and international/developing countries. Students will learn to translate theory into practical applications to current global health and developmental challenges. Course materials are designed for the adult-learner in an online, distributed format.

Admissions

Admission requirements to the program include:

- a bachelor's degree
- completion of Certificate Program Application Form
- working knowledge of and access to a PC or Mac with DVD/CD-ROM drive, high speed connection to the Internet as well as MS Office.
- the ability to download free versions of Adobe Acrobat Reader, Skype, and/or VSee video teleconferencing applications.

Required Courses

PBHL 704	Proseminar in Global Health Ethics (Offered as a series of three 1-credit seminar courses.)	3.0
PBHL 705	Public Health in Developing Countries	3.0
PBHL 706	Globalization, Development and Comparative Health Systems	3.0
PBHL 707	Monitoring and Evaluation in Global Health	3.0
PBHL 708	Global Health Integration Module and Field Practicum Experience	6.0
Total Credits		**18.0**

Certificate in Lesbian, Gay, Bisexual and Transgender (LGBT) Health

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree
Certificate Type: Certificate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.2207
Standard Occupational Classification (SOC) Code: 21-1091

The Certificate in Lesbian, Gay, Bisexual and Transgender (LGBT) Health program is designed to address the complex issues confronting the health disparities and health-seeking behaviors of LGBT people. The sequence of courses examines health disparities, research, sampling and measurement methodologies involved in the study of LGBT populations, and the intersections of social identities/inequalities (such as those based on ethnicity, sexual orientation and sex/gender among others).

The program is offered entirely online, and in a flexible format to provide qualified students and health professionals with an opportunity to acquire these credentials regardless of restrictions in time and physical location. Those who successfully complete the certificate program and wish to broaden their scope of public health education could pursue an MPH degree program.

Required Courses

PBHL 674	Studying Rare or Hidden Groups	3.0
PBHL 675	LGBT Health Disparities	3.0
PBHL 676	Intersectional Perspectives	3.0
Total Credits		**9.0**

Additional Information

For additional information about this program, contact:

Randall L. Sell, ScD
Department of Community Health and Prevention
School of Public Health, Drexel University
randy@drexel.edu

Community Health and Prevention

Major: Community Health and Prevention
Degree Awarded: Master of Public Health (MPH) or Doctor of Public Health (DrPH)
Calendar Type: Quarter
Total Credit Hours: 64.0 (MPH); 60.0 (DrPH)
Classification of Instructional Programs (CIP) code: 51.2201
Standard Occupational Classification (SOC) code: 11-9111; 21-1091; 21-1094

About the Program (MPH)

Master of Public Health (MPH)

The Master of Public Health program is intended for individuals interested in careers as community educators; population health planners; policy analysts, evaluators, researchers; and managers of health service delivery organizations and systems, managed-care programs, and other population-based organizations.

The 64.0 quarter-credit program is interdisciplinary and requires students to complete a comprehensive, community-based master's project. The program prepares students to enter an array of fields related to public health or a range of doctoral programs. Drexel University's Master of Public Health (MPH) program provides practical skills and experience, with a unique focus on relevant community issues, challenges, and priorities.

Program Highlights

The first year of the program covers the five core disciplines offered within the context of culture and community. These include environmental and occupational health; health care systems organization, management, and policy; social and behavioral sciences for population health; epidemiology; biostatistics. Throughout the program, group case discussion sessions, case-related activities and didactic sessions are integrated into the experience.

These include:

- Skill development labs and workshops (year two)
- Public health grand rounds (for all faculty, students, and community partners) provide access to scholars and their cutting-edge research and initiatives in public health

Curriculum

The MPH full-time educational program is structured on a quarter-term basis, with a total of 64.0 credit hours required. This is generally taken as a two-year program; all coursework must be completed within five years of the date of matriculation for the full-time program.

The second-year curriculum is composed of four required courses, three elective courses, and the Community-Based Master's Project (CBMP), the culminating experience required of full-time Drexel MPH students. Students spend approximately 12 hours each week working on a community-oriented, health-related project, often working as an integral part of a community-based organization. This can be in the areas of government, healthcare and social services, among others.

In preparation for developing their final paper, students are required to identify an issue or problem of significance to the target community or agency, synthesize the literature, develop an approach or methodology to address the issue and either implement and test the validity of a proposed approach or set out a detailed prescription for addressing the problem. Students may also work with faculty in specific research areas.

Joint Doctor of Medicine and Master of Public Health Degree (MD/MPH)

Students wishing to complete a course of study earning the joint MD/MPH degree can complete such a program in 5 years. They must apply for the joint program and be accepted by both the Drexel University College of Medicine and the School of Public Health. Students in this program have enriched public health content in their first two years of medical school and spend their third year of study full time in the School of Public Health. Students are able to enter clinical rotations and residency selection having obtained the MPH degree.

Additional Information

For additional information about this program, contact:

Stephanie Johnson
snj22@drexel.edu
267-359-6065

Doctor of Public Health (DrPH): 60.0 quarter credits

About the Program (DrPH)

Doctor of Public Health (DrPH)

Drexel University's School of Public Health (http://publichealth.drexel.edu) offers a doctoral program in Community Health and Prevention, leading to the doctor of public health (DrPH) degree. The mission of the School of Public Health is to promote health and quality of life through graduate education, applied research, and community service in the prevention and control of disease, injury, and disability. The DrPH program in Community Health and Prevention builds upon the unique strengths of the School of Public Health, including the master's program in public health, a multidisciplinary faculty, and institutional resources.

The goal of the DrPH program in Community Health and Prevention is to produce doctoral-level public health graduates who exhibit a broad-based, systemic understanding of public health and are committed to effecting meaningful change in public and/or community health systems. Integrating applied research, education, service and advocacy, the program emphasizes the application of interdisciplinary, theoretical, and applied research paradigms to the understanding and prevention of public health problems.

The DrPH program in Community Health and Prevention is structured as follows: *required courses*, which build core competencies in community health and prevention; *elective courses*, which develop specific areas of expertise; the *comprehensive exam*, which reassures student understanding and application of core public health competencies; the *practicum*, which structures the application of concepts and methods to solving public health problems; and the *dissertation*, which showcases the student's competency in applied research. This general framework is infused with community public health practice, rigorous qualitative and quantitative applied research methods, and skilled advocacy.

Developing Core Competencies for Understanding and Solving Public Health Problems

Students in the DrPH program in Community Health and Prevention are expected to attain five core competencies for understanding and solving specific public health problems. The core competencies for the DrPH program integrate public health competencies developed by the Council on Linkages between Academia and Public Health Practice* with the unique characteristics of the faculty of the Department of Community Health and Prevention and the practice community.

The five core competencies are as follows:

- Understand the mission, goals, and strategies of community health and prevention
- Understand and assess community health status and needs
- Understand and assess individual and environmental determinants of health
- Design, implement, and evaluate public health programs and policies
- Translate findings into policy recommendations and advocate for change

*The Council on Linkages between Academia and Public Health Practice represents national public health academic and practice organizations including the American Public Health Association, the Association of Schools of Public Health, and the Centers for Disease Control and Prevention. Over the past decade, the council has developed a list of public health competencies to guide curriculum development in public health education.

For more information, visit the Drexel University School of Public Health (http://publichealth.drexel.edu) website or contact:

Patience Ajoff-Foster, M.S.
Senior Academic Coordinator
pna24@drexel.edu
267-359-6036

Admission Requirements (DrPH)

Admission to the doctor of public health program in Community Health and Prevention is competitive. Students who demonstrate an ability to integrate public health competencies and skills into public health practice are preferred.

Applicants to the DrPH program must meet the following requirements:

- A master's of public health degree (MPH) or a master's degree in a related field
- Documented evidence of applied research
- Potential for a high level of performance in the DrPH program and for significant contributions to the field of public health.

To qualify for admission, the applicant must present a portfolio that includes:

- Undergraduate and graduate transcripts;
- GRE General Test (verbal, quantitative, analytical writing);
- Evidence of applied research skills (master's thesis, master's research paper, or publication);
- Three letters of recommendation, including one from a public health practitioner; and
- A written statement of career and educational goals, professional experience, and area of interest for the dissertation.
- An in-person or telephone interview is required of all finalists.

For more information about the admissions process, please contact:

Patience Ajoff-Foster, M.S.
Senior Academic Coordinator
pna24@drexel.edu
267-359-6036

Forms, details about requirements, and information about application deadlines are all available on the DrPH Community Health and Prevention (http://publichealth.drexel.edu/admissions/admissions-application-requirements/#full-time%20MPH) page of Drexel's Graduate Admissions website.

Degree Requirements

Foundation Courses		25.0
PBHL 516	Introduction to Public Health	
PBHL 520	Principles of Biostatistics	

PBHL 530	Principles of Epidemiology	
PBHL 540	Prevention Principles and Practices	
PBHL 600	Management, Leadership, Assurance and Health Services	
PBHL 640	Environmental Health	
PBHL 650	Public Policy and Advocacy	

Required Community-Based Master's Project Courses — 12.0

PBHL 680	Community Based Master's Project I
PBHL 681	Community Based Master's Project II
PBHL 682	Community Based Master's Project III

Required Courses — 12.0

PBHL 670	Multicultural Competence in Community Health and Prevention
PBHL 671	Theory and Practice of Community Health and Prevention
PBHL 672	Theory and Practice in Health Communication
PBHL 673	Outcomes Assessment of Community Health and Prevention

Electives * — 15.0

Students are required to successfully complete five electives (15.0 credits). These courses may be within the School of Public Health, or from other academic units within the University. Students must meet with their Academic Advisor in selecting their electives. It is the responsibility of the student to determine course restrictions and the registration process for campus electives taken at the Main Campus. The following is a sample of some of the School of Public Health electives offered by department:

Biostatistics Electives

PBHL 621	Intermediate Biostatistics II
PBHL 622	Statistical Inference I
PBHL 628	Survival Data Analysis
PBHL 629	Design & Analysis of Clinical Trials
PBHL 631	Applied Multivariate Analysis
PBHL 657	Data Management
PBHL 683	Advanced Clinical Trials & Experiment Design
PBHL 684	Statistical Inference II
PBHL 686	Advanced Statistical Computing
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research
PBHL 693	Applied Bayesian Analysis
PBHL 696	Nonparametric and Semiparametric Models
PBHL 699	Biostatistical Computing with Stata

Community Health and Prevention Electives

PBHL 674	Studying Rare or Hidden Groups
PBHL 675	LGBT Health Disparities
PBHL 676	Intersectional Perspectives
PBHL 678	Drug Use and Public Health
PBHL 801	Theory & Practice of Community Health & Preventions I
PBHL 803	Theory & Practice of Community Health and Preventions II
PBHL 804	Research Methods for Community Health and Prevention
PBHL 805	Qualitative Research in Community Health
PBHL 808	Community Program Evaluation
PBHL 810	Practicum in Community Health and Prevention
PBHL 814	Community Based Participatory Research
PBHL 823	Faith, Religion, Spirituality, and Health
PBHL 824	Public Health Ethics
PBHL 827	Advanced Topics in Qualitative Analysis

Environmental and Occupational Health Electives

PBHL 560	Overview of Issues in Global Health
PBHL 642	Healthy Housing & Built Environment
PBHL 645	Exposure Assessment
PBHL 646	Environmental Health in Vulnerable Populations
PBHL 648	Public Health and Disaster Preparedness
PBHL 649	Occupational and Environmental Cancers
PBHL 663	Injury Prevention and Control
PBHL 664	Safety in Healthcare

Epidemiology Electives

PBHL 532	Autism as a Public Health Challenge
PBHL 633	Epidemiology of Cancer
PBHL 635	Social Epidemiology and Psychiatric Epidemiology
PBHL 636	Infectious Disease Epidemiology
PBHL 638	Perinatal Epidemiology
PBHL 639	Cardiovascular Disease Epidemiology & Prevention
PBHL 655	Making Sense of Data
PBHL 656	Pharmacoepidemiology
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research

Health Management and Policy Electives

PBHL 604	Public Health Advocacy and Activism
PBHL 606	Vaccines and Public Health Policy
PBHL 610	Active Issues in Public Health
PBHL 612	Public Health Funding & Program Development
PBHL 613	Seminar in Fire Arms and Public Health
PBHL 614	Coordinating a Population's Care
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class
PBHL 616	Public Health Surveillance: Aligning Data and Policy Use
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic
PBHL 618	Historical and Contemporary Developments in Social Justice
PBHL 652	Public Health Leadership
PBHL 802	Health and Human Rights
PBHL 851	Health Systems Policy Analysis
PBHL 852	Health Economics I
PBHL 853	Health Economics II
PBHL 854	The Politics of Food & Gender
PBHL 856	Violence, Trauma and Adversity in Public Health

Total Credits — **64.0**

* 800 level courses may require professor's permission.

Degree Requirements

Completion of the DrPH program requires the following:

- 60.0 quarter credit hours of coursework beyond the master's degree (36.0 credits of required coursework; 9.0 credits of elective courses; a 3.0 credit practicum; and 12.0 credits for the dissertation). Coursework covers the theory and practice of community health and prevention, health and human rights, community health interventions, qualitative research methods, community epidemiology, statistical methods for prevention research, program evaluation, health policy development and analysis, and leadership and advocacy;
- a minimum cumulative grade point average of 3.3;
- completion of the a practicum experience;
- passage of the doctoral comprehensive/candidacy examination; and
- completion of a dissertation that is highly relevant to community health practice and involves applied research, policy analysis, or management analysis.

All coursework is designed to develop the five core competencies (http://publichealth.drexel.edu/academics/degrees/drph-degree-in-community-health) of community health and prevention.

Electives

The 9 credits of elective coursework enable doctoral students to expand and enhance skills within specific areas of competency. New courses are developed and added regularly, based on interests of faculty and students.

School Required Courses		12.0
PBHL 620	Intermediate Biostatistics I	
PBHL 630	Intermediate Epidemiology	
PBHL 802	Health and Human Rights	
PBHL 824	Public Health Ethics	
Department Required Courses		**24.0**
PBHL 632	Applied Survey Research in Epidemiology	
PBHL 801	Theory & Practice of Community Health & Preventions I	
PBHL 803	Theory & Practice of Community Health and Preventions II	
PBHL 804	Research Methods for Community Health and Prevention	
PBHL 805	Qualitative Research in Community Health	
PBHL 808	Community Program Evaluation	
PBHL 814	Community Based Participatory Research	
PBHL 825	Measuring Health	
Practicum		**3.0**
PBHL 810	Practicum in Community Health and Prevention	
Dissertation Sequence (12 credits minimum)		**12.0**
PBHL 901	Dissertation Seminar I	
PBHL 902	Dissertation Seminar II	
PBHL 998	Dissertation Guidance	
Electives [*]		**9.0**
PBHL 670	Multicultural Competence in Community Health and Prevention	
PBHL 671	Theory and Practice of Community Health and Prevention	
PBHL 672	Theory and Practice in Health Communication	
PBHL 673	Outcomes Assessment of Community Health and Prevention	
PBHL 678	Drug Use and Public Health	
PBHL 822	Course PBHL 822 Not Found	
PBHL 823	Faith, Religion, Spirituality, and Health	
PBHL 827	Advanced Topics in Qualitative Analysis	
Total Credits		**60.0**

[*] Students are not limited to the electives offered by the DrPH program. Each student is encouraged to choose electives that maximize the fit between the student's educational objectives and opportunities throughout the University.

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology.* Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy.* Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education.* Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy.* Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health.* Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health.* Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health.* Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy.* Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health.* Associate Teaching Professor. Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention.* Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law.* Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives.* Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health.* Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy.* Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School).* Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics.* Associate Professor. Statistics, experimental design/research methods and statistical analysis, clinical trials.

William J. Hickey, PhD *(Northwestern University) Department of Health Management and Policy.* Associate Teaching Professor. Organization behavior, health care administration.

Warren Hilton, MA *(Indiana University of Pennsylvania) Assistant Dean for Student and External Affairs.* Assistant Teaching Professor. Leadership development, organizational management, health disparities training.

Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics.* Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research.* Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy.* Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention.* Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

Brian K. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Neuroepidemiology, autism, dementia, environmental risk factors, gene-environmental interaction, propensity score methods, machine learning, stress.

Nora L. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Perinatal epidemiology; low birth weight; preterm birth; macrosomia; maternal and child health; second-hand smoke; environmental exposures; autism spectrum disorders; China.

Longjian Liu, MD, MSC, PhD *(University of Hong Kong) Department of Epidemiology and Biostatistics.* Associate Professor. Nutrition, aging, cross-cultural and racial/ethnic variation and health.

Raymond K. Lum, MPhil, MS *(University of Pennsylvania) Department of Health Management and Policy.* Associate Teaching Professor. Organizational learning theory, change management, systems thinking, innovation diffusion, technology transition, e-health.

Shannon Marquez, MEng, PhD *(University of North Carolina Gillings School of Global Public Health) Director of Global Public Health Initiatives, Interim Associate Dean.* Associate Professor. Agricultural safety, health disparities, environmental health, international health.

Yvonne Michael, ScD *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Associate Professor. Epidemiology of aging, social epidemiology, women's health, community-based participatory research.

Jana M. Mossey, PhD, MPH, MSN *(University of North Carolina) Department of Epidemiology and Biostatistics.* Professor. Epidemiological methods; research design and methods including observational and clinical trials research; psychosocial aspects of health; epidemiology of aging; depression and chronic pain; sub-threshold and minor depression; pain in the elderly.

Craig J. Newschaffer, PhD *(Johns Hopkins University) Chair, Department of Epidemiology and Biostatistics.* Professor. Development of methods for monitoring autism spectrum disorders prevalence; participation in the National CADDRE Study of Autism and Child Development.

Hernando Perez, PhD, MPH, CIH, CSP *(Purdue University) Department of Environmental and Occupational Health.* Assistant Teaching Professor. Children's environmental health, housing and health, environmental and occupational exposure assessment.

Marcia Polansky, MS, ScD, MSW *(Harvard University) Department of Epidemiology and Biostatistics.* Associate Professor. Biostatistics; experimental design/research methods and statistical analysis, clinical

trials; asthma epidemiology and interventions; attachment theory and mothers with drug and alcohol addictions.

John A. Rich, MD, MPH *(Duke University Medical School) Interim Dean, Dornsife School of Public Health; Chair, Department of Health Management and Policy*. Professor. Inner-city health problems, urban violence, male health and racial disparities.

Lucy Robinson, PhD *(Columbia University) Department of Epidemiology and Biostatistics*. Assistant Professor. Statistics; statistical analysis; spatial statistics/epidemiology; application of statistics to behavioral, biological and medical sciences; environmental health; neurological disorders.

John Rossi, VMD, M.Bioethics *(University of Pennsylvania) Department of Community Health and Prevention*. Assistant Professor. Bioethics and public health ethics, including moral theory, research ethics, ethics of risk & health communication, pediatric ethics, animal ethics.

Randall L. Sell, ScD *(Harvard University) Department of Community Health and Prevention*. Associate Professor. Demographic variables, defining and measuring sexual orientations, sampling sexual minorities for public health research.

David Barton Smith, PhD *(The University of Michigan School of Public Health) Department of Health Management and Policy*. Research Professor. Racial disparities in healthcare, long term care policy, health services research and program evaluation.

Loni Philip Tabb, PhD *(Harvard School of Public Health) Department of Community Health and Prevention*. Assistant Professor. Methods for categorical, missing and hierarchical data, spatial epidemiology/statistics.

Jennifer A. Taylor, PhD, MPH *(Johns Hopkins University) Department of Environmental and Occupational Health*. Associate Professor. Injury prevention and control, quality improvement, and occupational safety.

Renee M. Turchi, MD, MPH *(Johns Hopkins University) Department of Community Health and Prevention*. Associate Professor. Medical Home; children and youth with special health care needs; care coordination; cultural competency and access to care.

Nicole A. Vaughn, PhD *(Uniformed Services University of the Health Sciences) Department of Health Management and Policy*. Assistant Professor. Community-based approaches to eliminating health disparities, health care access and utilization among insured and uninsured minority groups, obesity, women's health and the influence of culture on health behaviors particularly for chronic conditions.

Augusta M. Villanueva, PhD *(University of Texas at Austin) Department of Community Health and Prevention*. Associate Professor. Role of race, culture, and ethnicity on health status/outcomes; community-based participatory research; immigrant communities; academic service-learning.

Seth Welles, PhD, ScD *(Boston University) Department of Epidemiology and Biostatistics*. Professor. Impact of HIV phenotypic and genotypic antiretroviral drug resistance on HIV disease progression and transmission; psychosocial risk for HIV infection and STDs among sexual minority adults and adolescents, and surveys of sexual minority adults at community festivals and at health-clinics to assess demographic and psychosocial determinants of sexual risk-taking and HIV/STD infections.

Yunwen Yang, PhD *(University of Illinois at Urbana-Champaign) Department of Epidemiology and Biostatistics*. Assistant Professor.

Statistics; bayesian methods; application of statistics to behavioral, biological and medical sciences; mixed methods.

Michael Yudell, MPH, MPhil, PhD *(Columbia University, City University of New York) Department of Community Health and Prevention*. Associate Professor. Public health genomics; bioethics; history of public health; and addiction.

Issa Zakeri, PhD *(University of Illinois and Urbana-Champaign) Department of Epidemiology and Biostatistics*. Professor. Biostatistics.

Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University)*. Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Health Policy and Social Justice

Major: Health Policy and Social Justice
Degree Awarded: Doctor of Public Health (DrPH)
Calendar Type: Quarter
Total Credit Hours: 60.0
Classification of Instructional Programs (CIP) code: 51.2201
Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Dornsife School of Public Health (http://drexel.edu/dornsife) offers a doctoral program in Health Policy and Social Justice, leading to the doctor of public health (DrPH) degree. The Doctor of Public Health in Health Policy and Social Justice is designed to prepare students to play strong professional roles in developing and implementing policies that improve public health by focusing on those in the community who are most vulnerable.

The mission of the Dornsife School of Public Health is to promote health and quality of life through graduate education, population-based research, and community service in the prevention and control of disease, injury and disability and the maintenance of health and quality of life. Effective public health practice is built on a foundation of effective programs and health policy and necessitates long-term partnerships with community, organizations and regulatory bodies.

Inequities based on social group memberships, including race, ethnicity, gender, sexual orientation and class, are well documented in the scientific literature. Equally alarming are disparities in access to health care and health outcomes based on race, ethnicity and other social indicators. Graduates of the DrPH in Health Policy and Social Justice will generate new knowledge about social justice and will use this knowledge in the analysis, evaluation and modification of existing policy as well as the design and delivery of new policy affecting public health practice.

The DrPH in Health Policy and Social Justice will prepare students to play strong professional roles in developing and implementing policies that improve public health by focusing on those who are most vulnerable. By studying important racial and ethnic, social class and gender differences within the larger social justice framework, students will emerge from the program with a sound theoretical and practical foundation for critical scholarship in health disparities, cultural competency and social justice. Furthermore, they will gain the tools to implement effective policies in both public and private health sectors.

Developing Core Competencies for Understanding and Solving Public Health Problems

The core competencies of the DrPH were developed in response to the proposed core competencies of the Council on Linkages between Academia and Public Health Practice. These competencies include the ability to:

1. Identify health system problems and health policy opportunities
2. Analyze structural, economic and political forces that affect the health of populations
3. Evaluate the social justice implications of policy formulation, analysis and implementation
4. Inform and education leaders and policy-makers about public health issues and opportunities
5. Develop policies and plans that support the health of the public
6. Apply sound health economics principals and methods to health policy analyses
7. Evaluate effectiveness, accessibility, outcomes and quality of health services
8. Research for new insights and innovative approaches to public health policy
9. Apply social justice and human rights principles when addressing health system and health policy problems and opportunities
10. Conduct policy and health services research to improve health and health services in diverse populations
11. Develop public health policies and strategies based upon well-articulated problem statements and an understanding of the values of the communities involved
12. Use appropriate methods of policy analysis, economic evaluation, measurement and statistical approaches to reach sound and defensible conclusions
13. Disseminate findings, analyses and effective models to the lay public, leaders and policy makers across disciplines.

Additional Information

For more information about the program, contact:

Allison Keene, MS
Dornsife School of Public Health/DrPH Program
Drexel University
Nesbitt Hall
3215 Market Street
Philadelphia PA 19104

ah849@drexel.edu
267.359.6032

Additional information can be found on the Dornsife School of Public Health (http://drexel.edu/dornsife) website.

Admission Requirements

Applicants to the DrPH Program in Health Policy and Social Justice must meet the following requirements:

- Completed MPH degree or other health-related master's degree program.*

- Potential for high level of performance in the DrPH Program and subsequent contributions to the field of Public Health Policy.

*Must be completed at least 1-year in advance of Fall enrollment for the DrPH Program.

Students will be admitted on a competitive basis, and those with a demonstrated ability to integrate public health competencies and skills into public health practice will be preferred. The admission portfolio will include:

- undergraduate and graduate transcript;
- three letters of recommendation from faculty or professionals who can evaluate the applicant's promise as a graduate student;
- official Graduate Record Examination scores;
- documented evidence of applied research or a writing sample;
- and a written statement of career and educational goals, professional experience, and area of research interest that aligns with a faculty member in the division of Health Management and Policy.

For international students or applicants who earned a degree outside of the US, an international transcript evaluation is required. For more information regarding international applicant requirements, view the International Students Admissions Information (http://drexel.edu/grad/resources/international) page.

An in-person or telephone interview is required of all finalists.

Additional Information

For more information about Admissions, contact:

Allison H. Keene, MS
Dornsife School of Public Health/DrPH Program
Drexel University
Nesbitt Hall 357
3215 Market Street
Philadelphia PA 19104

ah849@drexel.edu
267.359.6032

Forms, details about requirements, and information about application deadlines are all available on the DrPH in Health Policy and Social Justice (http://www.drexel.edu/grad/programs/pubhealth/health-policy-and-social-justice) page of Drexel's Graduate Admissions website.

Degree Requirements

Completion of the DrPH in Health Policy and Social Justice requires the following:

- 60 quarter credit hours of coursework beyond the master's degree (33 credits of required coursework; 12 credits of elective course; a 3 credit practicum; and 12 credits for the dissertation).
- a minimum cumulative grade point average of 3.3;
- completion of a practicum experience;
- passage of the doctoral comprehensive/candidacy examination; and
- completion of a dissertation that involves applied research, policy analysis, or management analysis.

All coursework is designed to develop the core competencies of health policy and social justice.

Electives

The 12 credits of elective coursework enable doctoral students to expand and enhance skills within specific areas of competency. New courses are developed and added regularly, based on interests of faculty and students. Students are not limited to the electives offered by the DrPH program. Each student is encouraged to choose electives that maximize the fit between the student's educational objectives and opportunities throughout the University.

Curriculum

Required Courses (Doctoral Core)		15.0
PBHL 620	Intermediate Biostatistics I	
PBHL 630	Intermediate Epidemiology	
PBHL 632	Applied Survey Research in Epidemiology	
PBHL 802	Health and Human Rights	
PBHL 804	Research Methods for Community Health and Prevention	
Department Required Courses		18.0
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class	
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic	
PBHL 618	Historical and Contemporary Developments in Social Justice	
PBHL 851	Health Systems Policy Analysis	
PBHL 805	Qualitative Research in Community Health	
or PBHL 855	Health Services Research	
PBHL 651	Legal Aspects of Public Health	3.0
PBHL 852	Health Economics I	3.0
PBHL 822 Practicum in HPSJ	Course PBHL 822 Practicum in HPSJ Not Found	
Dissertation (12 credits minimum)		12.0
PBHL 998	Dissertation Guidance	
Electives		12.0

In consultation with their advisors, students select elective courses appropriate for their educational goals. These courses may be from the School of Public Health or may be offered by other schools and colleges at Drexel University.

Total Credits	**63.0**

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology*. Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics*. Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy*. Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education*. Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy*. Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health*. Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health*. Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health*. Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy*. Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health*. Associate Teaching Professor. Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention*. Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics*. Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law*. Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives*. Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health*.

Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy.* Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School).* Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics.* Associate Professor. Statistics, experimental design/research methods and statistical analysis, clinical trials.

William J. Hickey, PhD *(Northwestern University) Department of Health Management and Policy.* Associate Teaching Professor. Organization behavior, health care administration.

Warren Hilton, MA *(Indiana University of Pennsylvania) Assistant Dean for Student and External Affairs.* Assistant Teaching Professor. Leadership development, organizational management, health disparities training.

Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics.* Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research.* Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy.* Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention.* Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

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Organizational learning theory, change management, systems thinking, innovation diffusion, technology transition, e-health.

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Issa Zakeri, PhD *(University of Illinois and Urbana-Champaign) Department of Epidemiology and Biostatistics.* Professor. Biostatistics.

Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University).* Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Environmental & Occupational Health

Major: Environmental & Occupational Health
Degree Awarded: Master of Public Health (MPH)
Calendar Type: Quarter
Total Credit Hours: 64.0
Classification of Instructional Programs (CIP) code: 51.2202
Standard Occupational Classification (SOC) code: 19-2041; 29-9011

About the Program

The Master of Public Health program is intended for individuals interested in careers as community educators; population health planners; policy analysts, evaluators, researchers; and managers of health service delivery organizations and systems, managed-care programs, and other population-based organizations.

The program is interdisciplinary and requires students to complete a community-based master's project. It prepares students to enter an array of fields related to public health or a range of doctoral programs. Drexel University's Master of Public Health (MPH) program provides practical skills and experience, with a unique focus on relevant community issues, challenges, and priorities. The 64.0 quarter-credit program is interdisciplinary and requires students to complete a comprehensive, community-based master's project. The program prepares students to enter an array of fields related to public health or a range of doctoral programs.

Program Highlights

The first year of the program covers the five core disciplines offered within the context of culture and community. These include environmental and occupational health; health care systems organization, management, and policy; social and behavioral sciences for population health; epidemiology; biostatistics. Throughout the program, group case discussion sessions, case-related activities and didactic sessions are integrated into the experience.

These include:

- Skill development labs and workshops (year two)
- Public health grand rounds (for all faculty, students, and community partners) provide access to scholars and their cutting-edge research and initiatives in public health

Curriculum

The MPH full-time educational program is structured on a quarter-term basis, with a total of 64.0 credit hours required. This is generally taken as a two-year program; all coursework must be completed within five years of the date of matriculation for the full-time program.

The second-year curriculum is composed of four required courses, three elective courses, and the Community-Based Master's Project (CBMP), the culminating experience required of full-time Drexel MPH students. Students spend approximately 12 hours each week working on a community-oriented, health-related project, often working as an integral part of a community-based organization. This can be in the areas of government, healthcare and social services, among others.

In preparation for developing their final paper, students are required to identify an issue or problem of significance to the target community or agency, synthesize the literature, develop an approach or methodology to address the issue and either implement and test the validity of a proposed approach or set out a detailed prescription for addressing the problem. Students may also work with faculty in specific research areas.

Joint Doctor of Medicine and Master of Public Health Degree (MD/MPH)

Students wishing to complete a course of study earning the joint MD/MPH degree can complete such a program in 5 years. They must apply for the joint program and be accepted by both the Drexel University College of Medicine and the School of Public Health. Students in this program have

enriched public health content in their first two years of medical school and spend their third year of study full time in the School of Public Health. Students are able to enter clinical rotations and residency selection having obtained the MPH degree.

Additional Information

For additional information about this program, contact:

Stephanie Johnson
snj22@drexel.edu
267.359.6065

Foundation Courses		25.0
PBHL 516	Introduction to Public Health	
PBHL 520	Principles of Biostatistics	
PBHL 530	Principles of Epidemiology	
PBHL 540	Prevention Principles and Practices	
PBHL 600	Management, Leadership, Assurance and Health Services	
PBHL 640	Environmental Health	
PBHL 650	Public Policy and Advocacy	

Required Community-Based Master's Project Courses		12.0
PBHL 680	Community Based Master's Project I	
PBHL 681	Community Based Master's Project II	
PBHL 682	Community Based Master's Project III	

Required Courses		12.0
PBHL 641	Environmental Hazard Assessment	
PBHL 643	Environmental and Occupational Toxicology	
PBHL 647	Occupational and Environmental Epidemiology	
PBHL 665	Environmental Risk Analysis	

Electives		15.0

Students are required to successfully complete five electives (15.0 credits). These courses may be within the School of Public Health, or from other academic units within the University. Students must meet with their Academic Advisor in selecting their electives. It is the responsibility of the student to determine course restrictions and the registration process for campus electives taken at the Main Campus. The following is a sample of some of the School of Public Health electives offered by department:

Biostatistics Electives	
PBHL 621	Intermediate Biostatistics II
PBHL 622	Statistical Inference I
PBHL 628	Survival Data Analysis
PBHL 629	Design & Analysis of Clinical Trials
PBHL 631	Applied Multivariate Analysis
PBHL 657	Data Management
PBHL 683	Advanced Clinical Trials & Experiment Design
PBHL 684	Statistical Inference II
PBHL 686	Advanced Statistical Computing
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research
PBHL 693	Applied Bayesian Analysis
PBHL 696	Nonparametric and Semiparametric Models
PBHL 699	Biostatistical Computing with Stata

Community Health and Prevention Electives

*800 level courses may require professor's permission

PBHL 674	Studying Rare or Hidden Groups
PBHL 675	LGBT Health Disparities
PBHL 676	Intersectional Perspectives
PBHL 678	Drug Use and Public Health
PBHL 801	Theory & Practice of Community Health & Preventions I
PBHL 803	Theory & Practice of Community Health and Preventions II
PBHL 804	Research Methods for Community Health and Prevention
PBHL 805	Qualitative Research in Community Health
PBHL 810	Practicum in Community Health and Prevention
PBHL 814	Community Based Participatory Research
PBHL 823	Faith, Religion, Spirituality, and Health
PBHL 824	Public Health Ethics
PBHL 827	Advanced Topics in Qualitative Analysis

Environmental and Occupational Health Electives

PBHL 560	Overview of Issues in Global Health
PBHL 642	Healthy Housing & Built Environment
PBHL 645	Exposure Assessment
PBHL 646	Environmental Health in Vulnerable Populations
PBHL 648	Public Health and Disaster Preparedness
PBHL 649	Occupational and Environmental Cancers
PBHL 663	Injury Prevention and Control
PBHL 664	Safety in Healthcare

Epidemiology Electives

PBHL 532	Autism as a Public Health Challenge
PBHL 633	Epidemiology of Cancer
PBHL 635	Social Epidemiology and Psychiatric Epidemiology
PBHL 636	Infectious Disease Epidemiology
PBHL 638	Perinatal Epidemiology
PBHL 639	Cardiovascular Disease Epidemiology & Prevention
PBHL 655	Making Sense of Data
PBHL 656	Pharmacoepidemiology
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research

Health Management and Policy Electives

*800 level courses may require professor's permission

PBHL 604	Public Health Advocacy and Activism
PBHL 605	Change Management in Public Health
PBHL 610	Active Issues in Public Health
PBHL 612	Public Health Funding & Program Development
PBHL 613	Seminar in Fire Arms and Public Health
PBHL 614	Coordinating a Population's Care
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class
PBHL 616	Public Health Surveillance: Aligning Data and Policy Use
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic

PBHL 618	Historical and Contemporary Developments in Social Justice	
PBHL 652	Public Health Leadership	
PBHL 802	Health and Human Rights	
PBHL 851	Health Systems Policy Analysis	
PBHL 852	Health Economics I	
PBHL 853	Health Economics II	
PBHL 854	The Politics of Food & Gender	
PBHL 856	Violence, Trauma and Adversity in Public Health	
Total Credits		**64.0**

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology.* Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy.* Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education.* Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy.* Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health.* Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health.* Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health.* Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy.* Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health.* Associate Teaching Professor.

Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention.* Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law.* Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives.* Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health.* Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy.* Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School).* Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics.* Associate Professor. Statistics, experimental design/ research methods and statistical analysis, clinical trials.

William J. Hickey, PhD *(Northwestern University) Department of Health Management and Policy.* Associate Teaching Professor. Organization behavior, health care administration.

Warren Hilton, MA *(Indiana University of Pennsylvania) Assistant Dean for Student and External Affairs.* Assistant Teaching Professor. Leadership development, organizational management, health disparities training.

Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics.* Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research.* Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy.* Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention.* Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

Brian K. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Neuroepidemiology, autism, dementia, environmental risk factors, gene-environmental interaction, propensity score methods, machine learning, stress.

Nora L. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Perinatal epidemiology; low birth weight; preterm birth; macrosomia; maternal and child health; second-hand smoke; environmental exposures; autism spectrum disorders; China.

Longjian Liu, MD, MSC, PhD *(University of Hong Kong) Department of Epidemiology and Biostatistics.* Associate Professor. Nutrition, aging, cross-cultural and racial/ethnic variation and health.

Raymond K. Lum, MPhil, MS *(University of Pennsylvania) Department of Health Management and Policy.* Associate Teaching Professor. Organizational learning theory, change management, systems thinking, innovation diffusion, technology transition, e-health.

Shannon Marquez, MEng, PhD *(University of North Carolina Gillings School of Global Public Health) Director of Global Public Health Initiatives, Interim Associate Dean.* Associate Professor. Agricultural safety, health disparities, environmental health, international health.

Yvonne Michael, ScD *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Associate Professor. Epidemiology of aging, social epidemiology, women's health, community-based participatory research.

Jana M. Mossey, PhD, MPH, MSN *(University of North Carolina) Department of Epidemiology and Biostatistics.* Professor. Epidemiological methods; research design and methods including observational and clinical trials research; psychosocial aspects of health; epidemiology of aging; depression and chronic pain; sub-threshold and minor depression; pain in the elderly.

Craig J. Newschaffer, PhD *(Johns Hopkins University) Chair, Department of Epidemiology and Biostatistics.* Professor. Development of methods for monitoring autism spectrum disorders prevalence; participation in the National CADDRE Study of Autism and Child Development.

Hernando Perez, PhD, MPH, CIH, CSP *(Purdue University) Department of Environmental and Occupational Health.* Assistant Teaching Professor. Children's environmental health, housing and health, environmental and occupational exposure assessment.

Marcia Polansky, MS, ScD, MSW *(Harvard University) Department of Epidemiology and Biostatistics.* Associate Professor. Biostatistics; experimental design/research methods and statistical analysis, clinical trials; asthma epidemiology and interventions; attachment theory and mothers with drug and alcohol addictions.

John A. Rich, MD, MPH *(Duke University Medical School) Interim Dean, Dornsife School of Public Health; Chair, Department of Health Management and Policy.* Professor. Inner-city health problems, urban violence, male health and racial disparities.

Lucy Robinson, PhD *(Columbia University) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; statistical analysis; spatial statistics/epidemiology; application of statistics to behavioral, biological and medical sciences; environmental health; neurological disorders.

John Rossi, VMD, M.Bioethics *(University of Pennsylvania) Department of Community Health and Prevention.* Assistant Professor. Bioethics and public health ethics, including moral theory, research ethics, ethics of risk & health communication, pediatric ethics, animal ethics.

Randall L. Sell, ScD *(Harvard University) Department of Community Health and Prevention.* Associate Professor. Demographic variables, defining and measuring sexual orientations, sampling sexual minorities for public health research.

David Barton Smith, PhD *(The University of Michigan School of Public Health) Department of Health Management and Policy.* Research Professor. Racial disparities in healthcare, long term care policy, health services research and program evaluation.

Loni Philip Tabb, PhD *(Harvard School of Public Health) Department of Community Health and Prevention.* Assistant Professor. Methods for categorical, missing and hierarchical data, spatial epidemiology/statistics.

Jennifer A. Taylor, PhD, MPH *(Johns Hopkins University) Department of Environmental and Occupational Health.* Associate Professor. Injury prevention and control, quality improvement, and occupational safety.

Renee M. Turchi, MD, MPH *(Johns Hopkins University) Department of Community Health and Prevention.* Associate Professor. Medical Home; children and youth with special health care needs; care coordination; cultural competency and access to care.

Nicole A. Vaughn, PhD *(Uniformed Services University of the Health Sciences) Department of Health Management and Policy.* Assistant Professor. Community-based approaches to eliminating health disparities, health care access and utilization among insured and uninsured minority groups, obesity, women's health and the influence of culture on health behaviors particularly for chronic conditions.

Augusta M. Villanueva, PhD *(University of Texas at Austin) Department of Community Health and Prevention.* Associate Professor. Role of race, culture, and ethnicity on health status/outcomes; community-based participatory research; immigrant communities; academic service-learning.

Seth Welles, PhD, ScD *(Boston University) Department of Epidemiology and Biostatistics.* Professor. Impact of HIV phenotypic and genotypic antiretroviral drug resistance on HIV disease progression and transmission; psychosocial risk for HIV infection and STDs among sexual minority adults and adolescents, and surveys of sexual minority adults at community festivals and at health-clinics to assess demographic and psychosocial determinants of sexual risk-taking and HIV/STD infections.

Yunwen Yang, PhD *(University of Illinois at Urbana-Champaign) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; bayesian methods; application of statistics to behavioral, biological and medical sciences; mixed methods.

Michael Yudell, MPH, MPhil, PhD *(Columbia University, City University of New York) Department of Community Health and Prevention.* Associate

Professor. Public health genomics; bioethics; history of public health; and addiction.

Issa Zakeri, PhD *(University of Illinois and Urbana-Champaign)*
Department of Epidemiology and Biostatistics. Professor. Biostatistics.

Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University)*. Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Epidemiology

Major: Epidemiology
Degree Awarded: Master of Science (MS); Master of Public Health (MPH);
Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 58.0 (MS); 64.0 (MPH); 69.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.1309
Standard Occupational Classification (SOC) code: 19-1041

About the Programs

The MS in Epidemiology

The goal of the MS in Epidemiology program is to produce graduates who have a solid understanding of epidemiologic principles and methods and the demonstrated ability and capacity to apply that understanding and skill. The curriculum and project requirements are designed to provide and then demonstrate the ability to effectively engage in research.

This includes the development of appropriate research questions and aims, the design and conduct of epidemiologic studies, and the appropriate analysis and interpretation and presentation of research data. Upon graduation, MS students will have attained competencies in two areas: general epidemiology knowledge and skills, and epidemiologic research methods.

The MPH in Epidemiology

The Master of Public Health program is intended for individuals interested in careers as community educators; population health planners; policy analysts, evaluators, researchers; and managers of health service delivery organizations and systems, managed-care programs, and other population-based organizations. It provides practical skills and experience, with a unique focus on relevant community issues, challenges, and priorities.

The 64.0 quarter-credit program is interdisciplinary and requires students to complete a comprehensive, community-based master's project. The program prepares students to enter an array of fields related to public health or a range of doctoral programs.

Program Highlights

The first year of the program covers the five core disciplines offered within the context of culture and community. These include environmental and occupational health; health care systems organization, management, and policy; social and behavioral sciences for population health; epidemiology; biostatistics.

Throughout the program, group case discussion sessions, case-related activities and didactic sessions are integrated into the experience. These include:

- skill development labs and workshops (year two)
- public health grand rounds (for all faculty, students, and community partners) provide access to scholars and their cutting-edge research and initiatives in public health

The PhD in Epidemiology

The PhD in Epidemiology program prepares students to approach problems with the critical analytic skills necessary for the generation of substantial and significant epidemiologic questions, and to utilize the most rigorous and parsimonious research strategies to answer such questions. Additionally, integral values of the Department and School will infuse students with the commitment to pursue important and innovative topics of inquiry even when faced with methodological challenges, and to undertake studies that generate knowledge applicable to diverse social, ethnic, and geographically defined populations.

Graduates will develop the skill and expertise necessary to initiate and direct the scientifically rigorous research necessary to generate the knowledge upon which to base public health and medical care policies and procedures designed to foster the maintenance and improvement of the health and well being of populations.

For additional information about these programs, visit Drexel's School of Public Health (http://publichealth.drexel.edu) web site.

Admission Requirements

Master of Science Program

Applicants to the MS in Epidemiology program must meet the following requirements:

- A baccalaureate degree
- Two semesters of calculus in college
- Two courses of biology (i.e. microbiology, physiology, genetics, etc.) in college
- The application package will include: undergraduate and graduate transcripts, three letters of recommendation from faculty or professionals who can evaluate the applicant's promise as a graduate student, GRE or MCAT scores, and a written statement of career and educational goals.
- Competitive applicants will possess a undergraduate GPA of 3.30 or higher and GRE or MCAT scores above the 60th percentile.

PhD Program

Applicants to the PhD program in Epidemiology must meet the following requirements:

- MPH degree or master's degree in epidemiology or a related field.
- Potential for high level of performance in the PhD program and subsequent contributions to the field of epidemiology.

The application package will include:

- undergraduate and graduate transcripts,
- three letters of recommendation from faculty or professionals who can evaluate the applicant's promise as a graduate student,
- official Graduate Record Examination scores (no other standardized test accepted for this program),
- a written statement of career and educational goals, professional experience, and area of research interest.

An in-person or telephone interview is required of all finalists.

All entering students are expected to have already completed introductory and intermediate level epidemiology and biostatistics courses (equivalents of PBHL 520 and PBHL 530) as part of their Master's program or must enroll in these courses, or their equivalents, as additional requirements.

Forms, details about requirements, and information about application deadlines are all available on the School of Public Health Programs (http://www.drexel.edu/grad/programs/pubhealth) page on Drexel's Graduate Admissions website.

Degree Requirements: MS in Epidemiology

Required Courses

Public Health

PBHL 516	Introduction to Public Health	2.0

Epidemiology

PBHL 530	Principles of Epidemiology	4.0
PBHL 630	Intermediate Epidemiology	3.0
PBHL 632	Applied Survey Research in Epidemiology	3.0
PBHL 633	Epidemiology of Cancer	3.0
PBHL 636	Infectious Disease Epidemiology	3.0
PBHL 691	Pathophysiology Basis of Epidemiologic Research	3.0

Biostatistics

PBHL 520	Principles of Biostatistics	4.0
PBHL 620	Intermediate Biostatistics I	3.0
PBHL 623	Introduction to Statistical Computing	3.0
PBHL 625	Longitudinal Data Analysis	3.0
PBHL 628	Survival Data Analysis	3.0

Master's Project Courses

PBHL 503	Course PBHL 503 Not Found (MS in Epidemiology Project)	3.0
PBHL 685	Data Analysis Project	6.0
PBHL 835	Proposal Writing Seminar	3.0

Electives 9.0

Students must select 9.0 credits total. Some potential electives include the following:

PBHL 629	Design & Analysis of Clinical Trials	
PBHL 634	Epidemiology for Public Health Practice	
PBHL 635	Social Epidemiology and Psychiatric Epidemiology	
PBHL 638	Perinatal Epidemiology	
PBHL 639	Cardiovascular Disease Epidemiology & Prevention	

Total Credits		**58.0**

Sample Plan of Study

First Year

Fall		Credits
PBHL 516	Introduction to Public Health	2.0
PBHL 520	Principles of Biostatistics	4.0
PBHL 530	Principles of Epidemiology	4.0
	Term Credits	**10.0**

Winter

PBHL 620	Intermediate Biostatistics I	3.0
PBHL 630	Intermediate Epidemiology	3.0
PBHL 632	Applied Survey Research in Epidemiology	3.0
	Term Credits	**9.0**

Spring

PBHL 623	Introduction to Statistical Computing	3.0
PBHL 636	Infectious Disease Epidemiology	3.0
PBHL 691	Pathophysiology Basis of Epidemiologic Research	3.0
	Term Credits	**9.0**

Second Year

Fall

PBHL 628	Survival Data Analysis	3.0
PBHL 633	Epidemiology of Cancer	3.0
PBHL 835	Proposal Writing Seminar	3.0
	Term Credits	**9.0**

Winter

PBHL 503	Course PBHL 503 Not Found (MS in Epidemiology Project)	3.0
PBHL 625	Longitudinal Data Analysis	3.0
MS in Epidemiology elective[*]		3.0
	Term Credits	**9.0**

Spring

PBHL 685	Data Analysis Project	6.0
Two MS in Epidemiology electives[*]		6.0
	Term Credits	**12.0**

Total Credit: 58.0

[*] Students must take 6.0 credits of electives in the second year. View the degree requirements for a list of potential electives, or check with the Department. Two electives may be taken in either fall, winter, or spring. This sample plan of study illustrates both electives being taken in the spring term.

Degree Requirements: MPH in Epidemiology

The MPH full-time educational program is structured on a quarter-term basis, with a total of 64.0 credit hours required. This is generally taken as a two-year program; all coursework must be completed within five years of the date of matriculation for the full-time program.

The second-year curriculum is composed of four required courses, three elective courses, and the Community-Based Master's Project (CBMP), the culminating experience required of full-time Drexel MPH students.

Students spend approximately 12 hours each week working on a community-oriented, health-related project, often working as an integral part of a community-based organization. This can be in the areas of government, healthcare and social services, among others. In preparation for developing their final paper, students are required to identify an issue or problem of significance to the target community or agency, synthesize the literature, develop an approach or methodology to address the issue and either implement and test the validity of a proposed approach or set

out a detailed prescription for addressing the problem. Students may also work with faculty in specific research areas.

Foundation Courses		25.0
PBHL 516	Introduction to Public Health	
PBHL 520	Principles of Biostatistics	
PBHL 530	Principles of Epidemiology	
PBHL 540	Prevention Principles and Practices	
PBHL 600	Management, Leadership, Assurance and Health Services	
PBHL 640	Environmental Health	
PBHL 650	Public Policy and Advocacy	

Required Community-Based Master's Project Courses		12.0
PBHL 680	Community Based Master's Project I	
PBHL 681	Community Based Master's Project II	
PBHL 682	Community Based Master's Project III	

Required Courses		15.0
PBHL 620	Intermediate Biostatistics I	
PBHL 623	Introduction to Statistical Computing	
PBHL 630	Intermediate Epidemiology	
PBHL 632	Applied Survey Research in Epidemiology	
PBHL 634	Epidemiology for Public Health Practice	

Electives		12.0

Students are required to successfully complete four electives (12.0 credits). These courses may be within the School of Public Health, or from other academic units within the University. Students must meet with their Academic Advisor in selecting their electives. It is the responsibility of the student to determine course restrictions and the registration process for campus electives taken at the Main Campus. The following is a sample of some of the School of Public Health electives offered by department:

Biostatistics Electives

PBHL 621	Intermediate Biostatistics II	
PBHL 622	Statistical Inference I	
PBHL 628	Survival Data Analysis	
PBHL 629	Design & Analysis of Clinical Trials	
PBHL 631	Applied Multivariate Analysis	
PBHL 657	Data Management	
PBHL 683	Advanced Clinical Trials & Experiment Design	
PBHL 684	Statistical Inference II	
PBHL 686	Advanced Statistical Computing	
PBHL 691	Pathophysiology Basis of Epidemiologic Research	
PBHL 692	Public Health Obesity Prevention Research	
PBHL 693	Applied Bayesian Analysis	
PBHL 696	Nonparametric and Semiparametric Models	
PBHL 699	Biostatistical Computing with Stata	

Community Health and Prevention Electives

*800 Level courses may require professor's permission

PBHL 674	Studying Rare or Hidden Groups	
PBHL 675	LGBT Health Disparities	
PBHL 676	Intersectional Perspectives	
PBHL 678	Drug Use and Public Health	
PBHL 801	Theory & Practice of Community Health & Preventions I	

PBHL 803	Theory & Practice of Community Health and Preventions II	
PBHL 804	Research Methods for Community Health and Prevention	
PBHL 805	Qualitative Research in Community Health	
PBHL 808	Community Program Evaluation	
PBHL 810	Practicum in Community Health and Prevention	
PBHL 814	Community Based Participatory Research	
PBHL 823	Faith, Religion, Spirituality, and Health	
PBHL 824	Public Health Ethics	
PBHL 827	Advanced Topics in Qualitative Analysis	

Environmental and Occupational Health Electives

PBHL 560	Overview of Issues in Global Health	
PBHL 642	Healthy Housing & Built Environment	
PBHL 645	Exposure Assessment	
PBHL 646	Environmental Health in Vulnerable Populations	
PBHL 648	Public Health and Disaster Preparedness	
PBHL 649	Occupational and Environmental Cancers	
PBHL 663	Injury Prevention and Control	
PBHL 664	Safety in Healthcare	

Epidemiology Electives

PBHL 532	Autism as a Public Health Challenge	
PBHL 633	Epidemiology of Cancer	
PBHL 635	Social Epidemiology and Psychiatric Epidemiology	
PBHL 636	Infectious Disease Epidemiology	
PBHL 638	Perinatal Epidemiology	
PBHL 639	Cardiovascular Disease Epidemiology & Prevention	
PBHL 655	Making Sense of Data	
PBHL 656	Pharmacoepidemiology	
PBHL 691	Pathophysiology Basis of Epidemiologic Research	
PBHL 692	Public Health Obesity Prevention Research	

Health Management and Policy Electives

*800 level courses may require professor's permission

PBHL 604	Public Health Advocacy and Activism	
PBHL 606	Vaccines and Public Health Policy	
PBHL 610	Active Issues in Public Health	
PBHL 612	Public Health Funding & Program Development	
PBHL 613	Seminar in Fire Arms and Public Health	
PBHL 614	Coordinating a Population's Care	
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class	
PBHL 616	Public Health Surveillance: Aligning Data and Policy Use	
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic	
PBHL 618	Historical and Contemporary Developments in Social Justice	
PBHL 652	Public Health Leadership	
PBHL 802	Health and Human Rights	
PBHL 851	Health Systems Policy Analysis	
PBHL 852	Health Economics I	
PBHL 853	Health Economics II	

PBHL 854	The Politics of Food & Gender	
PBHL 856	Violence, Trauma and Adversity in Public Health	
Total Credits		**64.0**

Degree Requirements: PhD in Epidemiology

Completion of the PhD in Epidemiology requires: (1) a minimum of 69.0 quarter credit hours of course work beyond the master's degree; (2) a minimum cumulative grade point average of 3.3; (3) passing the doctoral comprehensive examination; (4) passing the candidacy oral examination; (5) completing a dissertation of publishable quality; and (6) passing the final defense.

A student in the PhD degree program shall have seven calendar years from the date of initial registration to complete and successfully defend a dissertation.

Electives

All students must complete two epidemiology area electives and two biostatistics area electives.

School of Public Health Core Courses

PBHL 620	Intermediate Biostatistics I	3.0
PBHL 630	Intermediate Epidemiology	3.0
Select one of the following courses:		3.0
PBHL 802	Health and Human Rights	
PBHL 824	Public Health Ethics	
Departmental Required Courses		
PBHL 621	Intermediate Biostatistics II	3.0
PBHL 623	Introduction to Statistical Computing	3.0
PBHL 625	Longitudinal Data Analysis	3.0
PBHL 632	Applied Survey Research in Epidemiology	3.0
PBHL 636	Infectious Disease Epidemiology	3.0
PBHL 686	Advanced Statistical Computing	3.0
PBHL 691	Pathophysiology Basis of Epidemiologic Research	3.0
PBHL 826	Causal Inference in Epidemiology	3.0
PBHL 830	Advanced Epidemiology	4.0
PBHL 833	Epidemiology PhD Seminar	3.0
PBHL 834	Methodological Challenges	3.0
PBHL 835	Proposal Writing Seminar	3.0
Dissertation		10.0
PBHL 999	Thesis Research: Dissertation Guidance and Epidemiology [*]	
University Required Course		
EDUC 531	College Teaching & Communication Skills	1.0
A minimum of two Epidemiology Area electives:		6.0
PBHL 633	Epidemiology of Cancer	
PBHL 634	Epidemiology for Public Health Practice	
PBHL 635	Social Epidemiology and Psychiatric Epidemiology	
PBHL 638	Perinatal Epidemiology	
PBHL 639	Cardiovascular Disease Epidemiology & Prevention	
A minimum of two Biostatistics Area electives:		6.0
PBHL 622	Statistical Inference I	

PBHL 628	Survival Data Analysis	
PBHL 629	Design & Analysis of Clinical Trials	
Total Credits		**69.0**

See the PhD Program Guide (http://publichealth.drexel.edu/~/media/Files/publichealth/PhDEpi%20Program%20Guide-Final%202013-2014.ashx) for additional information.

[*] Number of credits taken each quarter is variable depending on stage of the project and other credit load. May be taken for additional credits if necessary.

Joint Doctor of Medicine and Master of Public Health Degree (MD/MPH)

Students wishing to complete a course of study earning the joint MD/MPH degree can complete such a program in 5 years. They must apply for the joint program and be accepted by both the Drexel University College of Medicine (http://www.drexelmed.edu/home/Admissions/MDProgram.aspx) and the School of Public Health.
Students in this program have enriched public health content in their first two years of medical school and spend their third year of study full time in the School of Public Health. Students are able to enter clinical rotations and residency selection having obtained the MPH degree.
For additional information about this program, contact:
Stephanie Johnson
snj22@drexel.edu
267.359.6065

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology.* Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy.* Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education.* Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy.* Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health.* Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational*

Health. Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health.* Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy.* Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health.* Associate Teaching Professor. Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention.* Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law.* Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives.* Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health.* Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy.* Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School).* Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics.* Associate Professor. Statistics, experimental design/ research methods and statistical analysis, clinical trials.

William J. Hickey, PhD *(Northwestern University) Department of Health Management and Policy.* Associate Teaching Professor. Organization behavior, health care administration.

Warren Hilton, MA *(Indiana University of Pennsylvania) Assistant Dean for Student and External Affairs.* Assistant Teaching Professor. Leadership development, organizational management, health disparities training.

Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics.* Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research.* Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy.* Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention.* Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

Brian K. Lee, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Neuroepidemiology, autism, dementia, environmental risk factors, gene-environmental interaction, propensity score methods, machine learning, stress.

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Jana M. Mossey, PhD, MPH, MSN *(University of North Carolina) Department of Epidemiology and Biostatistics.* Professor. Epidemiological methods; research design and methods including observational and clinical trials research; psychosocial aspects of health; epidemiology of aging; depression and chronic pain; sub-threshold and minor depression; pain in the elderly.

Craig J. Newschaffer, PhD *(Johns Hopkins University) Chair, Department of Epidemiology and Biostatistics.* Professor. Development of methods

for monitoring autism spectrum disorders prevalence; participation in the National CADDRE Study of Autism and Child Development.

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John A. Rich, MD, MPH *(Duke University Medical School) Interim Dean, Dornsife School of Public Health; Chair, Department of Health Management and Policy.* Professor. Inner-city health problems, urban violence, male health and racial disparities.

Lucy Robinson, PhD *(Columbia University) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; statistical analysis; spatial statistics/epidemiology; application of statistics to behavioral, biological and medical sciences; environmental health; neurological disorders.

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Jennifer A. Taylor, PhD, MPH *(Johns Hopkins University) Department of Environmental and Occupational Health.* Associate Professor. Injury prevention and control, quality improvement, and occupational safety.

Renee M. Turchi, MD, MPH *(Johns Hopkins University) Department of Community Health and Prevention.* Associate Professor. Medical Home; children and youth with special health care needs; care coordination; cultural competency and access to care.

Nicole A. Vaughn, PhD *(Uniformed Services University of the Health Sciences) Department of Health Management and Policy.* Assistant Professor. Community-based approaches to eliminating health disparities, health care access and utilization among insured and uninsured minority groups, obesity, women's health and the influence of culture on health behaviors particularly for chronic conditions.

Augusta M. Villanueva, PhD *(University of Texas at Austin) Department of Community Health and Prevention.* Associate Professor. Role of race, culture, and ethnicity on health status/outcomes; community-based participatory research; immigrant communities; academic service-learning.

Seth Welles, PhD, ScD *(Boston University) Department of Epidemiology and Biostatistics.* Professor. Impact of HIV phenotypic and genotypic antiretroviral drug resistance on HIV disease progression and transmission; psychosocial risk for HIV infection and STDs among sexual minority adults and adolescents, and surveys of sexual minority adults at community festivals and at health-clinics to assess demographic and psychosocial determinants of sexual risk-taking and HIV/STD infections.

Yunwen Yang, PhD *(University of Illinois at Urbana-Champaign) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; bayesian methods; application of statistics to behavioral, biological and medical sciences; mixed methods.

Michael Yudell, MPH, MPhil, PhD *(Columbia University, City University of New York) Department of Community Health and Prevention.* Associate Professor. Public health genomics; bioethics; history of public health; and addiction.

Issa Zakeri, PhD *(University of Illinois and Urbana-Champaign) Department of Epidemiology and Biostatistics.* Professor. Biostatistics.

Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University).* Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Executive Master of Public Health

Major: Public Health
Degree Awarded: Master of Public Health (MPH)
Calendar Type: Semester
Total Credit Hours: 42.0
Classification of Instructional Programs (CIP) code: 51.2201
Standard Occupational Classification (SOC) code: 11-9111; 21-1091; 21-1094

About the Program

Designed for working professionals, the Executive Masters of Public Health (MPH) program offers a convenient class schedule in which students can earn their degree in 21 months. Whether working in public health, a related health care setting or seeking a career change, the Executive MPH program is tailored for individuals who are committed to advancing their careers and acquiring the knowledge and tools to advance to leadership roles in public health. The program is fast-paced, intensive and demanding, but builds on each individual's former education, work experience and skills. The Executive MPH program is fully accredited by the Council on Education for Public Health (CEPH).

The Executive MPH curriculum combines both on-campus coursework and online modalities. Classes meet on-campus one Friday and one Saturday per month, and utilize web-based technologies to interact with faculty and students during the weeks when not in class. Classes are taught by full-time School of Public Health faculty with active and diverse research interests as well as adjunct faculty with leadership roles as practicing public health professionals.

Like the full-time MPH program, the Executive MPH program covers the major disciplines of public health including community health and prevention, environmental and occupational health, epidemiology and

biostatistics, and health management and policy. A significant portion of the curriculum incorporates a problem based learning (PBL) model in which the student becomes a self-directed learner as well as a collaborator in learning with their peers, assisted by the faculty facilitator. The PBL model develops the students' skill sets to design and effectively address the increasingly dynamic and evolving discipline of public health, and prepares each individual to be an effective life-long learner.

Additional Information

For more information, about this program, contact:

Colleen Baillie
Director of Enrollment
MPH Program
cpb32@drexel.edu

William Hickey, PhD
Executive MPH Program Director
wh34@drexel.edu

Or visit the School of Public Health's Executive Master of Public Health Degree (http://publichealth.drexel.edu/academics/degrees/executive-mph-degree) page.

Admission Requirements

The School of Public Health seeks students with intellectual and interpersonal competencies as well as those with potential for leadership. The school has set a high priority on establishing a student body that is representative of the nation's population. We strive to recruit and to admit applicants from underrepresented minority groups who can contribute to the richness of our student population and to that of the nation's public health professionals.

While most of the students in the Executive MPH program are from the Philadelphia area, the format of the program does not limit students from outside of the Philadelphia region from attending.

Admissions process:

- The Admissions Committee carefully reviews applications and gives personal essays and letters of recommendation particular attention.
- The selection process weighs prior academic and personal accomplishments, emphasizing demonstrated leadership.
- Diversity of background and outside interests, depth of self-appraisal, commitment to public heath, and working with individuals are highly valued.
- A minimum of 3 years of professional work experience is required.

Applicants should have:

- Satisfactorily completed an undergraduate bachelor degree program in an accredited US college or university, or its equivalent in another country
- A course in Statistics is highly recommended
- Six undergraduate or graduate credits in the social or behavioral sciences and three in the biological sciences are preferred, but not required.
- Satisfactory results from one of the following taken within the past five years (the GRE or GMAT is preferred):
  o Graduate Record Examination (GRE)
  o Graduate Management Admission Test (GMAT)
  o Medical College Admission Test (MCAT)

  o Law School Admission Test (LSAT)
- Test of English as a Foreign Language (TOEFL) for applicants whose first language is not English

The Application Process also requires:

- Completion of the School's application
- A personal essay describing what you perceive to be pressing public health issues, why a career in the field appeals to you, and how it will use your strengths and commitment
- Two letters of recommendation, preferably from individuals who can assess the applicant's ability to handle a rigorous graduate curriculum (i.e., faculty, supervisor, etc.)
- Resume or CV.

Forms, details about requirements, and information about application deadlines are all available on the Executive MPH (http://www.drexel.edu/grad/programs/pubhealth/public-health-executive) page of Drexel's Graduate Admissions website.

Degree Requirements

The Executive Program is designed for working professionals, whether in public health or considering a career change to public health. The program is tailored for individuals who are committed to advancing their careers and acquiring the knowledge and tools to advance to leadership roles in public health.

The Executive MPH program requires a minimum of 42.0 credits. All degree requirements must be completed within seven years of the date of matriculation. A minimum of five consecutive academic semesters is required for the degree. Enrollment must be continuous unless academic leaves are granted. A minimum overall GPA of 3.0 is required for graduation.

Required Courses

PBHL 520ES	BIOSTATISTICS	4.0
PBHL 530ES	Epidemiology	4.0
PBHL 540ES	Behavioral Assessment	4.0
PBHL 550ES	Community Based Prevention Practices	4.0
PBHL 570ES	Integrated Public Health Case Analysis	4.0
PBHL 600ES	Health Management and Leadership	4.0
PBHL 612ES	Program Planning & Evaluation	4.0
PBHL 640ES	Environmental & Occupational Health	4.0
PBHL 650ES	Health Policy & Advocacy	4.0
Master's Project Courses		
PBHL 560ES	MPH Comm Based MP Part A	1.0
PBHL 630ES	MPH Comm Based MP Part B	1.0
PBHL 635ES	MPH Comm Based MP Part C	2.0
Elective Courses		
Students must take two of the four courses listed below:		2.0
PBHL 516ES	Public Health History and Ethics	
PBHL 602ES	Practicing Public Health	
PBHL 699ES	Special Topics in PH	
PBHL 855ES	Course PBHL 855ES Not Found	
Total Credits		**42.0**

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology.* Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy.* Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education.* Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy.* Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health.* Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health.* Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health.* Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy.* Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health.* Associate Teaching Professor. Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention.* Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics.* Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law.* Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives.* Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health.* Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy.* Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School).* Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics.* Associate Professor. Statistics, experimental design/ research methods and statistical analysis, clinical trials.

William J. Hickey, PhD *(Northwestern University) Department of Health Management and Policy.* Associate Teaching Professor. Organization behavior, health care administration.

Warren Hilton, MA *(Indiana University of Pennsylvania) Assistant Dean for Student and External Affairs.* Assistant Teaching Professor. Leadership development, organizational management, health disparities training.

Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics.* Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research.* Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy.* Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention.* Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

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Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University).* Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Health Management and Policy

Major: Health Management and Policy
Degree Awarded: Master of Public Health (MPH)
Calendar Type: Quarter
Total Credit Hours: 64.0
Classification of Instructional Programs (CIP) code: 51.0701
Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Master of Public Health program is intended for individuals interested in careers as community educators; population health planners; policy analysts, evaluators, researchers; and managers of health service delivery organizations and systems, managed-care programs, and other population-based organizations.

The program is interdisciplinary and requires students to complete a community-based master's project. It prepares students to enter an array of fields related to public health or a range of doctoral programs. Drexel University's Master of Public Health (MPH) program provides practical skills and experience, with a unique focus on relevant community issues, challenges, and priorities. The 64.0 quarter-credit program is interdisciplinary and requires students to complete a comprehensive, community-based master's project. The program prepares students to enter an array of fields related to public health or a range of doctoral programs.

Program Highlights

The first year of the program covers the five core disciplines offered within the context of culture and community. These include environmental and occupational health; health care systems organization, management, and policy; social and behavioral sciences for population health; epidemiology; biostatistics. Throughout the program, group case discussion sessions, case-related activities and didactic sessions are integrated into the experience.

These include:

- Skill development labs and workshops (year two)
- Public health grand rounds (for all faculty, students, and community partners) provide access to scholars and their cutting-edge research and initiatives in public health

Curriculum

The MPH full-time educational program is structured on a quarter-term basis, with a total of 64.0 credit hours required. This is generally taken as a two-year program; all coursework must be completed within five years of the date of matriculation for the full-time program.

The second-year curriculum is composed of four required courses, three elective courses, and the Community-Based Master's Project (CBMP), the culminating experience required of full-time Drexel MPH students. Students spend approximately 12 hours each week working on a community-oriented, health-related project, often working as an integral part of a community-based organization. This can be in the areas of government, healthcare and social services, among others.

In preparation for developing their final paper, students are required to identify an issue or problem of significance to the target community or agency, synthesize the literature, develop an approach or methodology to address the issue and either implement and test the validity of a proposed approach or set out a detailed prescription for addressing the problem. Students may also work with faculty in specific research areas.

Joint Doctor of Medicine and Master of Public Health Degree (MD/MPH)

Students wishing to complete a course of study earning the joint MD/MPH degree can complete such a program in 5 years. They must apply for the joint program and be accepted by both the Drexel University College of Medicine and the School of Public Health. Students in this program have enriched public health content in their first two years of medical school and spend their third year of study full time in the School of Public Health. Students are able to enter clinical rotations and residency selection having obtained the MPH degree.

Additional Information

For additional information about this program, contact:

Stephanie Johnson
snj22@drexel.edu
267.359.6065

Program Requirements

Foundation Courses		25.0
PBHL 516	Introduction to Public Health	
PBHL 520	Principles of Biostatistics	
PBHL 530	Principles of Epidemiology	
PBHL 540	Prevention Principles and Practices	
PBHL 600	Management, Leadership, Assurance and Health Services	
PBHL 640	Environmental Health	
PBHL 650	Public Policy and Advocacy	
Required Community-Based Master's Project Courses		12.0
PBHL 680	Community Based Master's Project I	
PBHL 681	Community Based Master's Project II	
PBHL 682	Community Based Master's Project III	
Required Courses		12.0
Students must choose two courses from each of the following two categories of courses:		
Macro Theory and Practice		
PBHL 607	Evolution of United States Health Policy	
PBHL 609	Issues in United States Health Policy	
PBHL 618	Historical and Contemporary Developments in Social Justice	
PBHL 651	Legal Aspects of Public Health	
PBHL 852	Health Economics I	
Micro Theory and Practice		
PBHL 601	Management of Healthcare Outcomes	
PBHL 602	Public Health Practice	
PBHL 603	Advanced Healthcare Financial Management	
PBHL 605	Change Management in Public Health	
Electives		15.0

Students are required to successfully complete five electives (15.0 credits). These courses may be within the School of Public Health, or from other academic units within the University. Students must meet with their Academic Advisor in selecting their electives. It is the responsibility of the student to determine course restrictions and the registration process for campus electives taken at the Main Campus. The following is a sample of some of the School of Public Health electives offered by department:

Biostatistics Electives

PBHL 621	Intermediate Biostatistics II
PBHL 622	Statistical Inference I
PBHL 628	Survival Data Analysis
PBHL 629	Design & Analysis of Clinical Trials
PBHL 631	Applied Multivariate Analysis
PBHL 657	Data Management
PBHL 683	Advanced Clinical Trials & Experiment Design
PBHL 684	Statistical Inference II
PBHL 686	Advanced Statistical Computing
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research
PBHL 693	Applied Bayesian Analysis
PBHL 696	Nonparametric and Semiparametric Models
PBHL 699	Biostatistical Computing with Stata

Community Health and Prevention Electives

*800 level courses may require professor's permission

PBHL 674	Studying Rare or Hidden Groups
PBHL 675	LGBT Health Disparities
PBHL 676	Intersectional Perspectives
PBHL 678	Drug Use and Public Health
PBHL 801	Theory & Practice of Community Health & Preventions I
PBHL 803	Theory & Practice of Community Health and Preventions II
PBHL 804	Research Methods for Community Health and Prevention
PBHL 805	Qualitative Research in Community Health
PBHL 808	Community Program Evaluation
PBHL 810	Practicum in Community Health and Prevention
PBHL 814	Community Based Participatory Research
PBHL 823	Faith, Religion, Spirituality, and Health
PBHL 824	Public Health Ethics
PBHL 827	Advanced Topics in Qualitative Analysis

Environmental and Occupational Health Electives

PBHL 560	Overview of Issues in Global Health
PBHL 642	Healthy Housing & Built Environment
PBHL 645	Exposure Assessment
PBHL 646	Environmental Health in Vulnerable Populations
PBHL 648	Public Health and Disaster Preparedness
PBHL 649	Occupational and Environmental Cancers
PBHL 663	Injury Prevention and Control
PBHL 664	Safety in Healthcare

Epidemiology Electives

PBHL 532	Autism as a Public Health Challenge
PBHL 633	Epidemiology of Cancer
PBHL 635	Social Epidemiology and Psychiatric Epidemiology
PBHL 636	Infectious Disease Epidemiology
PBHL 638	Perinatal Epidemiology
PBHL 639	Cardiovascular Disease Epidemiology & Prevention
PBHL 655	Making Sense of Data
PBHL 656	Pharmacoepidemiology
PBHL 691	Pathophysiology Basis of Epidemiologic Research
PBHL 692	Public Health Obesity Prevention Research

Health Management and Policy Electives

*800 level courses may require professor's permission

PBHL 604	Public Health Advocacy and Activism
PBHL 606	Vaccines and Public Health Policy
PBHL 610	Active Issues in Public Health
PBHL 612	Public Health Funding & Program Development
PBHL 613	Seminar in Fire Arms and Public Health
PBHL 614	Coordinating a Population's Care
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class
PBHL 616	Public Health Surveillance: Aligning Data and Policy Use
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic
PBHL 618	Historical and Contemporary Developments in Social Justice
PBHL 652	Public Health Leadership
PBHL 802	Health and Human Rights
PBHL 851	Health Systems Policy Analysis
PBHL 853	Health Economics II
PBHL 854	The Politics of Food & Gender
PBHL 856	Violence, Trauma and Adversity in Public Health

Total Credits   **64.0**

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology.* Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics.* Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

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Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education.* Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy.* Assistant Professor.

Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health*. Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health*. Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

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Curtis E. Cummings, MD, MPH *(Jefferson Medical College) Department of Environmental and Occupational Health*. Associate Teaching Professor. Occupational medicine, radiology, chemical and radiation toxicity, Medical Corps, US Navy (Ret.).

Nancy Epstein, MPH *(University of North Carolina) Department of Community Health and Prevention*. Associate Teaching Professor. Healthcare for underserved communities, health education and coalition building, health and disability policy, oral health, faith and health.

Alison A. Evans, Sc D *(Harvard School of Public Health) Department of Epidemiology and Biostatistics*. Assistant Professor. Epidemiology studies of hepatitis B infection and its complications; prevention of liver cancer in East Asian populations in the Delaware Valley.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law*. Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Janet Fleetwood, PhD *(University of Southern California, School of Philosophy) Department of Community Health and Prevention; Vice Provost for Strategic Development & Initiatives*. Professor. Higher education strategy planning, faculty development and equity, bioethics.

Arthur L. Frank, MD, PhD *(Mount Sinai School Medicine City University of New York) Chair, Department of Environmental and Occupational Health*. Professor. Environmental and occupational health, agricultural safety and health, pneumoconiosis, occupational toxicology, environmental pollution.

Dennis Gallagher, MA, MPA *(University of Pittsburgh) Department of Health Management and Policy*. Associate Professor. Health policy, Medicare/Medicaid/SCHIP, health care access for the uninsured, health system transformation.

Marla Gold, MD *(University of Medicine and Dentistry-New Jersey Medical School)*. Professor. Design of HIV/AIDS care systems, treatment protocols, resource utilization, and epidemiology; CQI, managed care and

systems of health care, health administration, behavioral health care and substance abuse treatment systems.

Edward J. Gracely, PhD *(Temple University) Department of Epidemiology and Biostatistics*. Associate Professor. Statistics, experimental design/ research methods and statistical analysis, clinical trials.

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Mary E. Hovinga, PhD, MPH *(University of Michigan) Associate Dean of Academic Affairs; Department of Epidemiology and Biostatistics*. Associate Professor. Surveillance and etiology of mental retardation, environmental epidemiology, and the human health effects of heavy metals, PCBs and DDT.

Ann Klassen, PhD *(Johns Hopkins, Bloomberg School of Public Health) Department of Community Health and Prevention, Chair; Associate Dean for Research*. Professor. Social and geographical determinants of chronic disease disparities, cancer prevention and control, behavioral science.

Jennifer Kolker, MPH *(University of Michigan) Department of Health Management and Policy*. Associate Teaching Professor. Planning and policy development for health and welfare, early childhood education, epidemiological data collection and analysis, disease controls.

Stephen E. Lankenau, PhD *(University of Maryland) Department of Community Health and Prevention*. Associate Professor. Substance misuse, overdose prevention, high-risk youth, and mixed methods.

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Raymond K. Lum, MPhil, MS *(University of Pennsylvania) Department of Health Management and Policy*. Associate Teaching Professor. Organizational learning theory, change management, systems thinking, innovation diffusion, technology transition, e-health.

Shannon Marquez, MEng, PhD *(University of North Carolina Gillings School of Global Public Health) Director of Global Public Health Initiatives, Interim Associate Dean*. Associate Professor. Agricultural safety, health disparities, environmental health, international health.

Yvonne Michael, ScD *(Harvard School of Public Health) Department of Epidemiology and Biostatistics*. Associate Professor. Epidemiology of aging, social epidemiology, women's health, community-based participatory research.

Jana M. Mossey, PhD, MPH, MSN *(University of North Carolina) Department of Epidemiology and Biostatistics.* Professor. Epidemiological methods; research design and methods including observational and clinical trials research; psychosocial aspects of health; epidemiology of aging; depression and chronic pain; sub-threshold and minor depression; pain in the elderly.

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Lucy Robinson, PhD *(Columbia University) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; statistical analysis; spatial statistics/epidemiology; application of statistics to behavioral, biological and medical sciences; environmental health; neurological disorders.

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Seth Welles, PhD, ScD *(Boston University) Department of Epidemiology and Biostatistics.* Professor. Impact of HIV phenotypic and genotypic antiretroviral drug resistance on HIV disease progression and transmission; psychosocial risk for HIV infection and STDs among sexual minority adults and adolescents, and surveys of sexual minority adults at community festivals and at health-clinics to assess demographic and psychosocial determinants of sexual risk-taking and HIV/STD infections.

Yunwen Yang, PhD *(University of Illinois at Urbana-Champaign) Department of Epidemiology and Biostatistics.* Assistant Professor. Statistics; bayesian methods; application of statistics to behavioral, biological and medical sciences; mixed methods.

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Issa Zakeri, PhD *(University of Illinois and Urbana-Champaign) Department of Epidemiology and Biostatistics.* Professor. Biostatistics.

Interdepartmental Faculty

Robert J. Brulle, PhD *(George Washington University).* Professor. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

Public Health

Major: Public Health
Degree Awarded: Master of Public Health (MPH)
Calendar Type: Quarter
Total Credit Hours: 64.0
Classification of Instructional Programs (CIP) code: 51.2201
Standard Occupational Classification (SOC) code: 11-9111; 21-1091; 21-1094

About the Program

The Master of Public Health program is intended for individuals interested in careers as community educators; population health planners; policy analysts, evaluators, researchers; and managers of health service delivery organizations and systems, managed-care programs, and other population-based organizations.

The program is interdisciplinary and requires students to complete a community-based master's project. It prepares students to enter an array of fields related to public health or a range of doctoral programs.

Drexel University's Master of Public Health (MPH) program provides practical skills and experience, with a unique focus on relevant community issues, challenges, and priorities.

The 64.0 quarter-credit program is interdisciplinary and requires students to complete a comprehensive, community-based master's project. The

program prepares students to enter an array of fields related to public health or a range of doctoral programs.

Program Highlights

The first year of the program covers the five core disciplines offered within the context of culture and community. These include environmental and occupational health; health care systems organization, management, and policy; social and behavioral sciences for population health; epidemiology; biostatistics. During the second year of the program, students select one of five following concentrations from the school's four academic departments:

- Biostatistics
- Epidemiology
- Community Health and Prevention
- Environmental and Occupational Health
- Health Management and Policy

Throughout the program, group case discussion sessions, case-related activities and didactic sessions are integrated into the experience. These include:

- Skill development labs and workshops (year two);
- Public health grand rounds (for all faculty, students, and community partners) provide access to scholars and their cutting-edge research and initiatives in public health.

Curriculum

The MPH full-time educational program is structured on a quarter-term basis, with a total 64.0 credit hours required. This is generally taken as a two-year program; all coursework must be completed within seven years of the date of matriculation for the full-time program.

The second-year curriculum is composed of four courses in the chosen area of concentration (Biostatistics; Epidemiology; Community Health and Prevention; Environmental and Occupational Health; Health Management and Policy), three elective courses, and the Community-Based Master's Project (CBMP), the culminating experience required of full-time Drexel MPH students.

Students spend approximately 12 hours each week working on a community-oriented, health-related project, often working as an integral part of a community-based organization. This can be in the areas of government, healthcare and social services, among others. In preparation for developing their final paper, students are required to identify an issue or problem of significance to the target community or agency, synthesize the literature, develop an approach or methodology to address the issue, and either implement and test the validity of a proposed approach or set out a detailed prescription for addressing the problem. Students may also work with faculty in specific research areas.

Joint Doctor of Medicine and Master of Public Health Degree (MD/MPH)

Students wishing to complete a course of study earning the joint MD/MPH degree can complete such a program in 5 years. They must apply for the joint program and be accepted by both the Drexel University School of Medicine and the School of Public Health.

Students in this program have enriched public health content in their first two years of medical school and spend their third year of study full time in the School of Public Health. Students are able to enter clinical rotations and residency selection having obtained the MPH degree.

Additional Information

For additional information about this program, contact:

Stephanie Johnson
snj22@drexel.edu
267.359.6065

Admission Requirements

The School of Public Health seeks students with intellectual and interpersonal competencies as well as those with potential for leadership. The school has set a high priority on establishing a student body that is representative of the nation's population. We strive to recruit and to admit applicants from underrepresented minority groups who can contribute to the richness of our student population and to that of the nation's public health professionals.

Admissions Process

- The Admissions Committee carefully reviews applications and gives personal essays and letters of recommendation particular attention.
- The selection process weighs prior academic and personal accomplishments, emphasizing demonstrated leadership.
- Diversity of background and outside interests, depth of self-appraisal, commitment to public heath, and working with individuals are highly valued.
- Prior work experience in a field related to public health is highly recommended.

Applicants should have:

- Satisfactorily completed an undergraduate bachelor degree program in an accredited US college or university, or its equivalent in another country
- A course in Statistics is highly recommended
- Six undergraduate or graduate credits in the social or behavioral sciences and three in the biological sciences are preferred, but not required
- Satisfactory results from one of the following taken within the past five years (the GRE or GMAT is preferred):
  - Graduate Record Examination (GRE)
  - Graduate Management Admission Test (GMAT)
  - Medical College Admission Test (MCAT)
  - Law School Admission Test (LSAT)
- Test of English as a Foreign Language (TOEFL) for applicants whose first language is not English

Please note: Drexel University's School code for submitting GRE scores is 2194.

The Application Process also requires:

- Completion of the Schools of Public Health Common Application (http://www.sophas.org).
- A personal essay describing what you perceive to be pressing public health issues, why a career in the field appeals to you, and how it will use your strengths and commitment
- Three letters of recommendation
- Resume or CV

Applicants to the joint MD/MPH program must be accepted to both the Drexel College of Medicine (http://www.drexelmed.edu) and the School of Public Health (http://publichealth.drexel.edu).

Degree Requirements

The full-time educational program is structured on a quarter term basis, with a total credit hour requirement of 64.0 quarter credit hours. This is generally taken as a two-year program; all course work must be completed within four years of the date of matriculation for the full-time program.

Required core courses		25.0
PBHL 516	Introduction to Public Health	
PBHL 520	Principles of Biostatistics	
PBHL 530	Principles of Epidemiology	
PBHL 540	Prevention Principles and Practices	
PBHL 600	Management, Leadership, Assurance and Health Services	
PBHL 640	Environmental Health	
PBHL 650	Public Policy and Advocacy	
Required community-based Master's project courses		12.0
PBHL 680	Community Based Master's Project I	
PBHL 681	Community Based Master's Project II	
PBHL 682	Community Based Master's Project III	
Required Courses by Concentration		12.0

Near the end of their first year, students select a concentration area and complete four courses for a total of 12.0 credits.

Biostatistics		
PBHL 620	Intermediate Biostatistics I	
PBHL 621	Intermediate Biostatistics II	
PBHL 622	Statistical Inference I	
PBHL 630	Intermediate Epidemiology	
Community Health and Prevention		
PBHL 670	Multicultural Competence in Community Health and Prevention	
PBHL 671	Theory and Practice of Community Health and Prevention	
PBHL 672	Theory and Practice in Health Communication	
PBHL 673	Outcomes Assessment of Community Health and Prevention	
Environmental and Occupational Health		
PBHL 641	Environmental Hazard Assessment	
PBHL 643	Environmental and Occupational Toxicology	
PBHL 647	Occupational and Environmental Epidemiology	
PBHL 662	Environmental and Occupational Policy	
Epidemiology		
PBHL 620	Intermediate Biostatistics I	
PBHL 630	Intermediate Epidemiology	
PBHL 632	Applied Survey Research in Epidemiology	
PBHL 634	Epidemiology for Public Health Practice	
Health Management and Policy		

Students in this concentration must choose two courses from each of the following two categories of courses:

Macro Theory and Practice

PBHL 609	Issues in United States Health Policy
PBHL 611	Race, Ethnicity and Health
PBHL 651	Legal Aspects of Public Health
Micro Theory and Practice	
PBHL 601	Management of Healthcare Outcomes
PBHL 603	Advanced Healthcare Financial Management
PBHL 605	Change Management in Public Health

Electives		15.0

Students are required to successfully complete five electives (15.0 credits). These courses may be within the School of Public Health, or from other academic units within the University. Students must meet with their Academic Advisor in selecting their electives. It is the responsibility of the student to determine course restrictions and the registration process for campus electives taken at the Main Campus. The following is a sample of some of the School of Public Health electives offered by department:

Biostatistics Electives	
PBHL 623	Introduction to Statistical Computing
PBHL 628	Survival Data Analysis
PBHL 629	Design & Analysis of Clinical Trials
PBHL 657	Data Management
PBHL 684	Statistical Inference II
PBHL 686	Advanced Statistical Computing
Community Health and Prevention Electives	
PBHL 805	Qualitative Research in Community Health
PBHL 809	Community Health Policy Development and Analysis
Environmental and Occupational Health Electives	
PBHL 560	Overview of Issues in Global Health
PBHL 645	Exposure Assessment
PBHL 648	Public Health and Disaster Preparedness
PBHL 649	Occupational and Environmental Cancers
PBHL 661	Occupational and Environmental Diseases
Epidemiology Electives	
PBHL 532	Autism as a Public Health Challenge
PBHL 633	Epidemiology of Cancer
PBHL 636	Infectious Disease Epidemiology
PBHL 638	Perinatal Epidemiology
PBHL 639	Cardiovascular Disease Epidemiology & Prevention
PBHL 655	Making Sense of Data
PBHL 656	Pharmacoepidemiology
Health Management and Policy Electives	
COM 675	Grant Writing for the Arts and Humanities
PBHL 602	Public Health Practice
PBHL 604	Public Health Advocacy and Activism
PBHL 606	Vaccines and Public Health Policy
PBHL 607	Evolution of United States Health Policy
PBHL 615	Perspectives on Gender, Race, Ethnicity, and Social Class
PBHL 617	Health Disparities: Systemic, Structural, Environmental & Economic
PBHL 618	Historical and Contemporary Developments in Social Justice

PBHL 652	Public Health Leadership	
PBHL 802	Health and Human Rights	
PBHL 817	Economic Evaluation Methods for Community Health and Prevention	
PBHL 851	Health Systems Policy Analysis	
PBHL 852	Health Economics I	
PBHL 854	The Politics of Food & Gender	
PBHL 856	Violence, Trauma and Adversity in Public Health	

Total Credits   **64.0**

School of Public Health Faculty

Amy Auchincloss, PhD *(University of Michigan) Department of Biostatistics and Epidemiology*. Assistant Professor. Environmental determinants of health and the health effects of air pollution; contribution of resources in residential environments to health behaviors, obesity, diabetes and cardiovascular disease; the use of spatial analysis methods and agent-based mode

Zekarias Berhane, PhD *(University of Pittsburgh) Department of Epidemiology and Biostatistics*. Assistant Research Professor. Modeling time-to-event data with single and multiple outcomes, mixed effect models and regression diagnostics.

Sandra Bloom, MD *(Temple University School of Medicine) Department of Health Management and Policy*. Associate Professor. Psychological trauma and organizational stress.

Jennifer Breaux, DrPh, MPH *(Drexel School of Public Health) Department of Community Health and Prevention; Office of Academic Affairs, Director of Undergraduate Public Health Education*. Assistant Teaching Professor. Maternal and child health, community health, human rights.

Darryl R. Brown, PhD *(Johns Hopkins Bloomberg School of Public Health) Department of Health Management and Policy*. Assistant Professor. Health care research and planning; patient outcomes and applied health economic methods.

Igor Burstyn, PhD *(Utrecht University) Department of of Environmental and Occupational Health*. Associate Professor. Occupational and environmental epidemiology, industrial hygiene.

Carla Campbell, MD, MS *(Kentucky College of Medicine; Mount Sinai School of Medicine) Department of Environmental and Occupational Health*. Associate Professor. Community and environmental medicine, pediatrics, lead poisoning.

Esther Chernak, MD, MPH, FACP *(UMDNJ-Robert Wood Johnson Medical School) Department of of Environmental and Occupational Health*. Associate Research Professor. Public health emergency preparedness, infectious diseases, public health practice, global health.

Mariana Chilton, PhD, MPH *(University of Pennsylvania) Department of Health Management and Policy*. Associate Professor. Human rights and health; race, ethnicity and poverty; nutrition and chronic disease; ethnography and participatory research; complementary and alternative medicine.

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Thomas R. Kline School of Law

The Thomas R. Kline School of Law (http://www.drexel.edu/law) was established in 2006, and was built on the strengths of Drexel University, including experiential education and the fields of engineering, science, business, and health care.

The School offers the Juris Doctor (JD) degree, which has been designed to prepare law students for the challenges of 21st-century practice. Students can elect to fulfill concentrations in business and entrepreneurship law, health law, intellectual property law, and criminal law. The School also offers a Master of Legal Studies (MLS) program for individuals in other disciplines and professions who would benefit from focused legal knowledge in their field.

Educational Objectives

The educational objectives of the Thomas R. Kline School of Law include knowledge of the law, training in practical skills, and commitment to professionalism. The Juris Doctor (JD) degree program offers a standard law school curriculum, to ensure that its graduates are well-equipped to pass the bar examination upon graduation and to be competent legal professionals, regardless of their particular practice areas. Students may complete the JD on a full-time basis in either two or three years.

The Master of Legal Studies (MLS) program and associated certificates, designed for individuals who are not seeking to become attorneys, are intended to develop and improve career-related skills through the study of the legal system, legal writing, law, regulation, and policy.

Accreditation

The Juris Doctor program at the Thomas R. Kline School of Law at Drexel University is fully accredited by the American Bar Association (ABA). The ABA does not offer accreditation to non-JD programs, but has acquiesced to the Master of Legal Studies and certificate programs offered by the Thomas R. Kline School of Law.

Majors

- American Legal Practice (LLM) (p. 442)
- Juris Doctor (JD) (p. 445)
- Legal Studies (MLS) (p. 444)
- Trial Advocacy and Dispute Resolution (LLM) (p. 446)

Certificates

- Criminal Law (p. 442)
- Health Care Compliance (p. 442)
- Human Resources Compliance (p. 443)
- NCAA Compliance (p. 443)

Admissions Requirements

Admission to the Thomas R. Kline School of Law is determined using a variety of factors evaluated by the law admissions committee. For Juris Doctor (JD) candidates, the committee evaluates the student's LSAT score, academic record (including graduate degrees), work and volunteer experience, and personal background.

To apply, prospective JD students submit the following:

- a resume - describing employment history, including part-time and summer employment.
- a personal statement - essay discussing motivation for attending law school and how the Thomas R. Kline School of Law will help the applicant achieve his or her goals.
- LSDAS registration - all applicants, including those educated abroad, are required to register with the Law School Data Assembly Service (LSDAS). The LSDAS will provide Drexel University with a report containing information important in the admission process.

Visit the Law School Admission Council Website at www.lsac.org (http://www.lsac.org) for more information and to register.

The report includes an undergraduate academic summary; undergraduate, graduate and law/professional school transcripts; LSAT scores; and letters of recommendation (at least two) processed by the Law School Admission Council (LSAC).

To access the online application (http://drexel.edu/law/admissions/apply) or for additional guidelines on how to apply, visit the Thomas R. Kline School of Law (http://www.drexel.edu/law) website.

Students who are interested in the Master of Legal Studies or Certificate programs should visit www.drexel.com (http://www.drexel.com) to apply through Drexel University Online.

Facilities

Located in the heart of the University's main campus in University City, the Thomas R. Kline School of Law (http://www.drexel.edu/law) is in a 57,254 square foot facility that includes:

- a 2-story atrium and balcony area for meetings, receptions and casual conversation
- two large classrooms, seating 72
- one moot courtroom, seating 65
- one medium classroom, seating 55
- two classrooms, seating 32
- two seminar rooms
- one classroom, seating 18
- thirty-seven offices for full-time faculty, plus 2 offices for adjunct professors
- office space for student organizations, Trial Team, Moot Court, Law Review and in-house clinics
- the Legal Research Center (http://www.earlemacklaw.drexel.edu/lrc), one-floor library with 14,500 linear feet of shelving
- quiet study areas and group study rooms within the library

Additionally, the Thomas R. Kline School of Law utilizes space in the Dornsife Center for Neighborhood Partnerships and the Papadakis Integrated Sciences Building. The entire area shares Drexel's campus-wide wireless access to the internet, and all classrooms include data ports for each student and high-tech audio/visual resources. The law building is located on Market Street, between 33rd and 34th Streets. It is also a half-block from both the Market-Frankford elevated subway line (serving Center City and the Northeast), as well as the subway-surface lines (serving the City's western suburbs), making the law school convenient to where students will live and to the courts and co-op placements in the downtown legal district.

School of Law Faculty

Tabatha Abu El-Haj, PhD, LLM, JD *(New York University; Georgetown University Law Center; New York University School of Law).* Associate Professor. Constitutional law (specifically, First Amendment and election law), popular constitutionalism, administrative law, and the sociology of law.

Bret D. Asbury, JD *(Yale Law School).* Associate Professor. Civil procedure; law and literature.

Adam Benforado, JD *(Harvard Law School).* Associate Professor. Law and mind sciences, corporate law and contract law.

Mark P. Bernstein, MLS, JD *(University of Pittsburgh; Tulane University Law School) Legal Research Center Director.* Professor. Legal research, legal education, interdisciplinary research and the role of librarians as educators.

Amelia Boss, JD *(Rutgers-Camden School of Law).* Trustee Professor. Commercial law, including electronic payment systems, bankruptcy and contracts.

Susan Brooks, JD *(New York University) Associate Dean for Experiential Learning.* Professor. Clinical and co-op education; family law; children's rights; legal ethics.

Chapin Cimino, JD *(University of Chicago Law School).* Associate Professor. Contract law; constitutional law; law and humanities; higher education law.

David S. Cohen, JD *(Columbia University School of Law).* Associate Professor. Constitutional law; civil rights; sex discrimination.

Clare Keefe Coleman, JD *(Villanova University School of Law) Director of Student Advising.* Assistant Teaching Professor. Writing specialist.

Roger J. Dennis, JD *(Northwestern University School of Law) Founding Dean.* Professor. Corporate law; business organizations; civil procedure; law and economics.

Tracye Edwards, JD *(Duke University School of Law).* Assistant Teaching Professor. Co-op education.

Daniel M. Filler, JD *(New York University School of Law) Senior Associate Dean for Academic and Faculty Affairs.* Professor. Criminal law and procedure; sentencing and death penalty; law and society; law and humanities.

Richard H. Frankel, LLM, JD *(Georgetown University Law Center; Yale Law School) Director of the Appellate Litigation Clinic.* Associate Professor. Appellate litigation, access to justice in areas including consumer, administrative, and immigration law.

Barry Furrow, JD *(Harvard Law School) Director of Health Law Concentration.* Professor. Health law; torts.

Alex Geisinger, LLM, JD *(Harvard Law School; University of Connecticut School of Law).* Professor. Environmental law; torts; commercial law; behavioral law and economics.

Deborah Gordon, JD *(New York University School of Law).* Associate Professor. Trusts and estates, gift tax, legal methods.

Beth L. Haas, JD *(Villanova University School of Law) Faculty Director for Online Education.* Assistant Teaching Professor. Aviation litigation, product liability defense and toxic torts.

Aimèe Kahan, JD *(University of Pennsylvania School of Law) Director of the Master of Legal Studies Program.* Assistant Teaching Professor. Appellate law and the functioning of court and judicial systems; bioethics; reproductive rights; intersection of law and religion.

Anil Kalhan, MPPM, JD *(Yale School of Management; Yale Law School).* Associate Professor. Immigration and citizenship law, constitutional law, comparative law and criminal law.

Nancy C. Kraybill, JD *(University of California-Los Angeles School of Law) Director of Academic Skills.* Associate Teaching Professor. Arbitration, mediation, civil litigation and academic skill development.

Amy Landers, JD *(University of California) Director of the Intellectual Property Law Program.* Professor. Patents and intellectual property law.

Rachel Lopez, LLM, JD *(Universite Paris 1, Pantheon-Sorbonne; University of Texas School of Law) Director of the Community Lawyering Clinic.* Assistant Professor. Appellate law and the functioning of court and judicial systems; bioethics; reproductive rights; intersection of law and religion.

Lisa T. McElroy, JD *(Harvard Law School).* Associate Professor. Legal methods; United States Supreme Court practice, family law.

Amy Montemarano, JD *(Rutgers University School of Law – Camden).* Assistant Teaching Professor. Legal research and writing.

Kevin P. Oates, LLM, JD *(Temple University School of Law; Pace University School of Law) Senior Associate Dean of Students.* Associate Professor. Legal methods; evidence; conflicts of law; legal ethics.

Karl Okamoto, JD *(Columbia University School of Law) Director of Business and Entrepreneurial Law Concentration.* Professor. Entrepreneurship; business organizations; corporate law; venture finance; securities law.

Reena E. Parambath, JD *(Temple University School of Law) Director of the Co-op Program.* Associate Teaching Professor.

Pammela Quinn Saunders, JD *(Duke University School of Law).* Assistant Professor. International law and enforcement of legal norms at the international and domestic levels.

Terry Jean Seligmann, JD *(New York University School of Law) Director of Legal Writing.* Arlin M. Adams Professor of Legal Writing. Legal methods; education and special education law.

Norman P Stein, JD *(Duke University School of Law).* Professor. Pension law; employee benefits; tax law.

Gwen Roseman Stern, JD *(Temple University School of Law) Director of Trial Advocacy Program.* Associate Teaching Professor. Medical malpractice and product-liability law, trial advocacy and community awareness of legal procedures.

Donald F. Tibbs, PhD, LLM, JD *(Arizona State University; University of Wisconsin Law School; University of Pittsburgh School of Law).* Associate Professor. The overlapping issues of law, civil rights, criminal procedure, race and punishment and professional responsibility.

Kevin Woodson, PhD, JD *(Princeton University; Yale Law School).* Associate Professor. Race and the legal profession; criminal procedure; civil rights law.

Emily B. Zimmerman, JD *(Yale Law School) Director of the Criminal Law Program.* Associate Professor. Legal methods; criminal law and procedure.

Interdepartmental Faculty

Rose Corrigan, PhD *(Rutgers University).* Associate Professor. Women, public law, American politics and policy.

David DeMatteo, PhD, JD *(MCP Hahnemann University; Villanova University School of Law) Director of the JD-PhD Program in Law and Psychology.* Associate Professor. Psychopathy, forensic mental health assessment, drug policy; offender diversion.

Robert I. Field, PhD, JD, MPH *(Boston University; Columbia University School of Law; Harvard University School of Public Health) Joint Appointment between Dornsife School of Public Health and Earle Mack School of Law.* Professor. Health law and public health; ethical issues in managed care, public policy and legal facets of health care reform and genetic screening.

Emeritus Faculty

Donald Bersoff, JD, PhD *(Yale University, New York University).* Professor Emeritus. Law and psychology; mental health law.

American Legal Practice

Major: American Legal Practice
Degree Awarded: Masters of Law (LLM)
Calendar Type: Semester
Total Credit Hours: 24.0
Classification of Instructional Programs (CIP) code: 22.0101
Standard Occupational Classification (SOC) code: 23-1011

Degree Requirements

The Master of Laws (LL.M.) in American Legal Practice is designed for students who have completed, at minimum, an LL.B. or its equivalent outside of the United States. The LL.M. provides these students with a sophisticated knowledge of U.S. legal practice and grounds them in a basic understanding of U.S. law.

To earn the LL.M., students must successfully complete 24 semester credits. There are no distribution requirements. Every student will receive individualized academic counseling and the student's individual program of study will be set up in consultation with an advisor.

Admission Requirements

Students must have an earned Bachelor of Laws (LL.B.) or its equivalent. Admissions will be based on applicant grades from their prior institutions. No entry exam is required, except that students who have completed their first law degree program in a language other than English will be required to have a minimum score on the TOEFL or a comparable exam.

Certificate in Criminal Law

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 4.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 45.0401
Standard Occupational Classification (SOC) Code: 19-3041

The certificate is a post-baccalaureate non-degree program designed for individuals to develop and improve career-related skills in the diverse fields that relate to criminal law, such as law enforcement, probation and parole, corrections, social work, immigration and customs, and the military. The certificate program includes both a small core of general law courses that and form the and study of central issues in criminal law.

Admission Requirements

Acceptance for graduate study at Drexel University requires a four-year bachelor's degree from a regionally accredited institution in the United States or an equivalent international institution. Applicants who have not received a degree in the United States are required to take the Test of English as a Foreign Language (TOEFL).

This program is designed to be completed on a part-time basis and requires 15.0 semester credits. Students may apply for transfer in to the Master of Legal Studies program prior to completing their certificate, and apply all earned credits toward the Master of Legal Studies (p. 444).

LSTU 500S	Introduction to the Legal System	2.0
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting	3.0
LSTU 502S	Ethics and Professional Standards	2.0
LAW 558S	Criminal Law	3.0
LAW 670S	Criminal Procedure: Investigations	3.0
LSTU 530S	Corrections Law	2.0
Total Credits		**15.0**

Certificate in Health Care Compliance

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 4.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0717
Standard Occupational Classification (SOC) Code: 13-1041

The certificate in health care compliance is a post-baccalaureate non-degree program designed for individuals to develop and improve career-related skills in the focused area of health care compliance. The program includes a small core of general law courses, focused training in ethics and compliance, and in-depth study of crucial issues in health care regulation. Ideal candidates include individuals working in the health care field who would benefit from focused legal knowledge regarding compliance, as well as individuals seeking career changes.

Admission Requirements

Acceptance for graduate study at Drexel University requires a four-year bachelor's degree from a regionally accredited institution in the United States or an equivalent international institution. Applicants who have not received a degree in the United States are required to take the Test of English as a Foreign Language (TOEFL).

This program is designed to be completed on a part-time basis and requires 15.0 semester credits. Students may apply for transfer in to the Master of Legal Studies program prior to completing their certificate, and apply all earned credits toward the Master of Legal Studies (p. 444).

Required Courses

LSTU 500S	Introduction to the Legal System	2.0
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting	3.0
LSTU 502S	Ethics and Professional Standards	2.0
LSTU 504S	Health Care Rules and Regulations	3.0
LSTU 505S	Health Care Quality, Patient Safety and Risk Management	3.0
LSTU 506S	Patients and Privacy: HIPAA and Related Regulations	2.0
Total Credits		**15.0**

Certificate in Human Resources Compliance

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 4.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 52.1099
Standard Occupational Classification (SOC) Code: 13-1071

The Certificate in Human Resources Compliance is a post-baccalaureate non-degree program designed for individuals to develop and improve career-related skills in the focused area of human resources compliance. The certificate program includes both a small core of general law courses, focused training in ethics and compliance, and in-depth study of crucial issues in human resources rules and regulation. Ideal candidates include individuals working in human resources and related fields who would benefit from focused legal knowledge regarding compliance, as well as individuals seeking career changes.

Admission Requirements

Acceptance for graduate study at Drexel University requires a four-year bachelor's degree from a regionally accredited institution in the United States or an equivalent international institution. Applicants who have not received a degree in the United States are required to take the Test of English as a Foreign Language (TOEFL).

The program is designed to be completed on a part-time basis and requires 15.0 semester credits. Students may apply for transfer in to the Master of Legal Studies program prior to completing their certificate, and apply all earned credits toward the Master of Legal Studies (p. 444).

Program Requirements

LSTU 500S	Introduction to the Legal System	2.0
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting	3.0
LSTU 502S	Ethics and Professional Standards	2.0
LSTU 520S	Legal Issues in Employee Hiring and Termination	3.0
LSTU 521S	Human Resources Compliance: Managing the Employer/Employee Relationship	3.0
LSTU 522S	Human Resources in Practice: Negotiation, Mediation, and Alternative Dispute Resolution	2.0
Total Credits		**15.0**

Certificate in NCAA Compliance

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 4.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 31.0504
Standard Occupational Classification (SOC) Code: 25-1193

The certificate in NCAA compliance is a post-baccalaureate non-degree program designed for individuals to develop and improve career-related skills in the focused area of compliance with NCAA—National Collegiate Athletic Association—rules and regulations. The certificate program includes a small core of general law courses, focused training in ethics and compliance, and in-depth study of crucial issues in NCAA regulatory compliance. Ideal candidates include individuals working in collegiate sports programs who would benefit from focused legal knowledge regarding compliance, as well as individuals seeking career changes.

Admission Requirements

Acceptance for graduate study at Drexel University requires a four-year bachelor's degree from a regionally accredited institution in the United States or an equivalent international institution. Applicants who have not received a degree in the United States are required to take the Test of English as a Foreign Language (TOEFL).

The program is designed to be completed on a part-time basis and requires 15.0 semester credits. Students may apply for transfer in to the Master of Legal Studies program prior to completing their certificate, and apply all earned credits toward the Master of Legal Studies (p. 444).

Required Courses

LSTU 500S	Introduction to the Legal System	2.0
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting	3.0
LSTU 502S	Ethics and Professional Standards	2.0
LSTU 510S	NCAA Governance Process	2.0
LSTU 511S	NCAA Rules I and Infractions Cases	3.0
LSTU 512S	NCAA Rules II and Enforcement Process	3.0
Total Credits		**15.0**

Master of Legal Studies

Major: Legal Studies
Degree Awarded: Master of Legal Studies (MLS)
Calendar Type: Semester
Total Credit Hours: 30.0
Classification of Instructional Programs (CIP) code: 22-9999
Standard Occupational Classification (SOC) code: 11-1071; 13-1011; 13-1075

About the Program

As society becomes increasingly regulated, job candidates with advanced skills in legal and regulatory analysis, as well as regulatory compliance, have become highly appealing to many employers. Although many employers do not want to hire additional attorneys, they require employees with sophisticated and narrowly focused exposure to law and legal regulation.

The Master of Legal Studies (MLS) program is a post-baccalaureate degree designed for individuals to develop and improve career-related skills through the study of the legal system, legal writing, law, regulation, and policy. Ideal candidates include individuals in other disciplines, professionals who would benefit from focused legal knowledge (such as those in the fields of health, college sports, education, human resources, finance, etc.), individuals seeking career changes, and those generally interested in the field of law. Upon completion of each degree program, graduates will understand how the law relates to and impacts their particular areas of interest, although they will not be attorneys.

Currently, four optional concentrations are offered:

- Criminal Law
- Health Care Compliance
- Human Resources Compliance
- NCAA Compliance and Sports Law

The program is designed to be completed on either a part-time or full-time basis.

Degree Requirements

All students must complete the required core curriculum courses, and additional electives or concentration courses, totaling 30.0 semester credits.

Within the program, four optional concentrations are currently offered:

- Criminal Law
- Health Care Compliance
- Human Resources Compliance
- NCAA Compliance and Sports Law

Required Core Curriculum Courses

LSTU 500S	Introduction to the Legal System	2.0
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting	3.0
LSTU 502S	Ethics and Professional Standards	2.0
LSTU 503S	Legal Research and Analysis	3.0
LSTU 507S	Risk Assessment and Management	3.0
LSTU 540S	MLS Masters Capstone	3.0-4.0
Electives or Concentration		

Complete LSTU, LAW electives or any combination of electives & concentrations		13.0-14.0
Total Credits		**30.0**

Health Care Compliance Concentration [*]

Required Courses		
LSTU 504S	Health Care Rules and Regulations	3.0
LSTU 505S	Health Care Quality, Patient Safety and Risk Management	3.0
LSTU 506S	Patients and Privacy: HIPAA and Related Regulations	2.0
Total Credits		**8.0**

[*] In the process of completing the core courses, students completing this concentration select the LSTU 540S MLS Capstone course section that is focused on health care compliance.

NCAA Compliance and Sports Law Concentration [*]

Required Courses		
LSTU 510S	NCAA Governance Process	2.0
LSTU 511S	NCAA Rules I and Infractions Cases	3.0
LSTU 512S	NCAA Rules II and Enforcement Process	3.0
Total Credits		**8.0**

[*] In the process of completing the core courses, students completing this concentration select the LSTU 540S MLS Capstone course section that is focused on NCAA and sports law.

Human Resources Compliance Concentration [*]

Required Courses		
LSTU 520S	Legal Issues in Employee Hiring and Termination	3.0
LSTU 521S	Human Resources Compliance: Managing the Employer/Employee Relationship	3.0
LSTU 522S	Human Resources in Practice: Negotiation, Mediation, and Alternative Dispute Resolution	2.0
Total Credits		**8.0**

[*] In the process of completing the core courses, students completing this concentration select the LSTU 540S MLS Capstone course section that is focused on human resources compliance.

Criminal Law Concentration [*]

Required Courses		
LAW 558S	Criminal Law	3.0
LAW 670S	Criminal Procedure: Investigations	3.0
LSTU 530S	Corrections Law	2.0
Total Credits		**8.0**

[*] In the process of completing the core courses, students completing this concentration select the LSTU 540S MLS Capstone course section that is focused on criminal law.

Higher Education Compliance Concentration [*]

Required Courses		
LSED 532S	Legal Landscape of Student Rights and Campus Safety	

LSED 533S	Institutional Compliance: Aid and Accreditation	
LSED 534S	Higher Education Institutions: Financial Rules and Regulations	
Total Credits		**0.0**

* In the process of completing the core courses, students completing this concentration select the LSTU 540S MLS Capstone course section that is focused on higher education compliance.

The JD Program

Major: Law
Degree Awarded: Juris Doctor (JD)
Calendar Type: Semester
Total Credit Hours: 85.0
Classification of Instructional Programs (CIP) code: 22.0101
Standard Occupational Classification (SOC) code: 23-1011

About the Program

The School of Law offers a rigorous law curriculum that aims to prepare students for the realities of practice, combining the classic foundation of legal education with the experiential components that are so vital to both Drexel University's mission and to legal employers today. Students have the option of completing the JD in the traditional three years, or through an accelerated two-year program designed to get students into the legal workforce faster, with the same essential skills and knowledge.

Students spend their first year on campus being introduced to the foundations of legal analysis, skills, and professionalism in a diverse learning community. The program includes traditional first-year courses, such as contracts and criminal law. It also includes a comprehensive legal methods course, taught by full-time faculty, which instructs students on the fundamentals of legal writing and analysis, as well as a class on interviewing, counseling, and negotiation. Students choose one elective course as part of their first year curriculum.

The remaining curriculum exposes students to a broad array of topics relevant to the study of law. Students are required to complete courses in professional responsibility, legal writing and other practice skills, and statutory law. Students must also complete at least 50 hours of pro bono work.

The Experiential Education Program

Students are required to complete either a co-op placement or a clinical experience in order to graduate. This requirement provides students with an integrated learning experience that prepares them for the complexities of modern-day practice. Additionally, students can choose from a broad selection of simulation courses that involve in-depth trial practice, advocacy, litigation, transactional practice, and alternative dispute resolution.

The cooperative education program allows upper-level students to spend a semester - or in some cases, a full year - at a single legal placement. The School of Law has relationships with a wide-ranging selection of co-op partners including judicial chambers, private law firms, in-house counsel offices, and non-profit organizations, but has also assisted many students in creating opportunities in other practice jurisdictions. Students are not paid for their work but will instead receive academic credits for their co-op experiences and for a lawyering practice seminar that must be taken in conjunction with the co-op.

The school offers students the chance to represent real clients in a clinical setting. Clinical offerings include a Civil Litigation Field Clinic, Criminal Litigation Field Clinic, Appellate Litigation Clinic, Community Lawyering Clinic, and Entrepreneurial Law Clinic. These experiences are paired with a seminar that guides students through reflection on their work and its impact on the community.

About the Concentrations

The Thomas R. Kline School of Law builds on some of the strengths for which Drexel University is nationally known by offering four optional concentrations. These are areas in which there are expanding employment opportunities and a need for specialized knowledge and skills: intellectual property, health, business & entrepreneurship, and criminal law. These concentrations consist not only of specialized courses taught in the classroom, but also experiential learning opportunities such as co-ops and simulations.

Joint Degrees

For those law students interested in pursuing expertise in another area of study, the School also offers several joint degrees combining law with other subjects, including Law and Business Administration (JD/MBA), Law and Library and Information Science (JD/MSLIS), (p. 260)Law and Psychology (JD /PhD (p. 260)), Law and Public Health (JD/MPH), and Law and Public Policy (JD/MSPP). For more details about joint degree opportunities, visit the Thomas R. Kline School of Law Joint Degree (http://www.drexel.edu/law/academics/jointDegrees) website.

Additional Information

For additional information about the JD program, visit the the Thomas R. Kline School of Law (http://www.drexel.edu/law) website.

Degree Requirements

Required Courses

LAW 550S	Torts	4.0
LAW 552S	Contracts	4.0
LAW 554S	Civil Procedure	4.0
LAW 556S	Property	4.0
LAW 558S	Criminal Law	4.0
LAW 560S	Constitutional Law	5.0
LAW 565S	Legal Methods I	3.0
LAW 566S	Legal Methods II	3.0
LAW 568S	Intro to Interviewing, Counseling, and Negotiations	1.0
LAW 830S	Professional Responsibility	3.0
1st-Year Elective (LAW 57X) *		2.0
Total Credits		**37.0**

A total of 85 semester credits are required to graduate, with a minimum of 61 credits of "in-class" coursework (see Law School Student Handbook for courses that do not count.)

Additional Requirements:

Students must also complete:

1. At least one legal writing course designated as meeting the standard of the Upper-Level Writing requirement [WUL], as indicated by the course materials;

2. At least one Skills course, as indicated by the course material; and

3. At least one Statutory course, as indicated by the course materials.

Professional Practice Requirement

Beginning with students admitted for the traditional three-year JD in Fall of 2014, a Professional Practice Requirement will be implemented. Students can meet this requirement by enrolling in a law co-op or a law clinic.

Pro Bono Requirement

Students must fulfill a minimum of 50 hours of qualifying pro bono service.

*The Senior Associate Dean of Students may waive this course requirement for students who transfer in after their first year.

Trial Advocacy and Dispute Resolution

Major: Trial Advocacy and Dispute Resolution
Degree Awarded: Master of Laws (LLM)
Calendar Type: Semester
Total Credit Hours: 24.0
Classification of Instructional Programs (CIP) code: 22.0101
Standard Occupational Classification (SOC) code: 23-1022

About the Program

The LLM in Trial Advocacy and Dispute Resolution will train students to become more effective client advocates in a variety of dispute-related settings. These include client interviewing and counseling, pre-trial advocacy, jury selection, and appellate advocacy. The program is designed to both re-train attorneys whose work has not previously demanded, or taught, such skills, as well as to improve the advocacy skills of attorneys who already work in this area.

The LLM may be taken either part-time or full-time. Students may maintain part-time status by enrolling in a minimum of 5.0 credits per semester. To maintain full-time status, students must enroll in a minimum of 9.0 credits per academic semester. The program is designed to be completed in either one or two years.

Additional information about the Thomas R. Kline School of Law (http://drexel.edu/law) is available on the school's website.

Admission Requirements

The LLM program is open to applicants who have received a JD, an LLB, or a comparable law degree. International applicants must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL) or similar examination. In addition to test scores, telephone or Skype interviews may also be used for foreign applicants.

Applications will be accepted on a rolling basis, but new students will typically begin in the Fall semester.

Degree Requirements

The LLM is a 24-credit program, with 17.0 credits made up of required courses:

Required Courses

LAW 637S	Advanced Evidence	3.0
LAW 646S	Mediation and Arbitration	3.0
LAW 904S	Advanced Trial Advocacy: Civil	3.0
or LAW 906S	Advanced Trial Advocacy: Criminal	
LAW 811S	Expert Witnesses	3.0
LAW 882S	Litigation Drafting	2.0
LAW 981S	Litigation Technology	3.0

In addition, students must complete additional credits through electives. Students may complete:

LAW 982S	Jury Selection	2.0
LAW 904S	Advanced Trial Advocacy: Civil *	3.0
or LAW 906S	Advanced Trial Advocacy: Criminal	
LAW 660S	E-Discovery & Digital Evidence	2.0
LAW 910S	Appellate Advocacy	2.0
LAW 900S	Pre-Trial Advocacy	2.0
LAW 890S	Improvisation for Lawyers	1.0

* Students may select the version of Advanced Trial Advocacy they did not select in fulfillment of the core requirement.

The LLM degree will be conferred only after the student completes 24.0 credits. A student must maintain a GPA of 2.20 each semester and at program completion.

Sample Plan of Study

Students may complete the LLM in one or two years, depending on whether the student chooses to pursue the degree on a full-time or part-time basis. A potential plan of study for a full-time student would be as follows:

First Year		
Fall		**Credits**
LAW 637S	Advanced Evidence	3.0
LAW 906S	Advanced Trial Advocacy: Criminal	3.0
LAW 981S	Litigation Technology	3.0
LAW 882S	Litigation Drafting	2.0
	Term Credits	**11.0**

Total Credit: 11.0

First Year		
Spring		**Credits**
LAW 646S	Mediation and Arbitration	3.0
LAW 811S	Expert Witnesses	3.0
Electives		7.0
	Term Credits	**13.0**

Total Credit: 13.0

Course Descriptions

Quarter

Graduate

Antoinette Westphal College of Media Arts Design (A)

College of Arts and Sciences (AS)

LeBow College of Business (B)

College of Computing and Informatics (CI)

College of Engineering (E)

Goodwin College of Professional Studies (GC)

College of Nursing Health Professions (NH)

School of Public Health (PH)

COM School of Biomedical Sciences Professional Studies (QQ)

School of Biomedical Engineering, Science Health Systems (R)

Center for Hospitality and Sport Management (SH)

School of Education (T)

University Courses (X)

Accounting

Adult Education

Architectural Engineering

Architecture

Art History

Arts Administration

Biomedical Engineering & Science

Bioscience & Biotechnology

Business Statistics

Career Integrated Education

Chemical Engineering

Chemistry

Civil Engineering

Communication

Complement & Integrative Therapy

Computer Science

Computing & Security Technology

Construction Management

Cooperative Management

Couple & Family Therapy

Creative Arts in Therapy

Creativity Studies

Design and Merchandising

Digital Media

E-Learning

Economics

Education Human Resource Development

Education Improvement & Transformation

Education Learning Technology

Educational Administration

Educational Lifelong Literacy

Educational Policy

Electrical & Computer Engineering

Electrical & Computer Engineering - Computers

Electrical & Computer Engineering - Electroph

Electrical & Computer Engineering - Power Engineering

Electrical & Computer Engineering - Systems

Emergency Medical Services

Engineering Geology

Engineering Management

Engineering Technology

Engineering, General

Environmental Engineering

Environmental Policy

Environmental Science

Fashion Design

Finance

Food Science

Forensic Criminalistic Analy

Forensic Science

General Business

Geography Education

Global & International Education

Higher Education

History

Homeland Security Management

Hotel & Restaurant Management

Human Resource Management

Industrial Design

Information Science & Systems

Interior Design

International Business

Intra Professional Studies

Legal Studies

Linguistics

Management

Management of Information Systems

Marketing

Materials Engineering

Mathematics

Mathematics Education

Mechanical Engineering & Mechanics

Medical Family Therapy

Museum Education

Museum Leadership

Neuroscience

Nursing

Nursing and Health Professions

Nutrition & Food Science

Operations Management

Operations Research

Organizational Behavior

Physical Therapy Rehab Science

Physician Assistant

Physics

Physics - Environmental Science

Political Science

Production Operations Management

Professional Studies

Project Management

Property Management

Psychology

Public Health

Public Policy

Publication Management

Real Estate

Rehabilitation Sciences

Research

Special Education

Sport Management

Systems Engineering

Taxation

Teacher Education

Telecommunications

Television Management

Visual Studies

Semester

- Graduate (p. 449)
- Undergraduate (http://catalog.drexel.edu/coursedescriptions/semester/undergrad)

Graduate

Thomas R. Kline School of Law (L)

Biomedical Graduate Studies_COM (MB)

College of Medicine (MS)

School of Public Health (PH)

COM School of Biomedical Sciences Professional Studies (QQ)

Academic Medicine

Anatomy

Anesthesiology

Biochemistry

Cancer Biology

Cardiothoracic Surgery

Clinical Research

Clinical Research Health Prof

Communication & Preventative Medicine (noncredit)

Communication & Preventitive Medicine (credit)

Critical Care

Dermatology

Drexel Pathway to Medicine

Emergency Medicine

Family Medicine

Forensic Criminalistic Analysis

Forensic Science

Histotechnology

Human & Molecular Genetics

IMS Prog. Interdepartmental Sciences

Interdepartmental

Interdiscplinary Health Science

Law

Legal Studies

MMS Prog. - Masters in Med. Science

Master of Lab Animal Science

Medical Science Preparatory

Medical and Healthcare Simulation

Medicine

Microbiology and Immunology

Molecular & Cellular Bio & Genetics

Neurology

Neuroscience

Neurosurgery

Obstetrics & Gynecology

Office of Medical Education

Orthopedics

Otolaryngology

Otolaryngology

Pathologists Assistant

Pathology

Pediatrics

Pharmacology

Physical Med & Rehabilitation

Physiology

Pre - Medical

Program in Integrated Learning

Psychiatry

Public Health

Radiation Oncology

Radiation Sciences

Radiologic Sciences

Surgery

Women's Health Ed. Program

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